

Cognitive Behavioural Therapy Skills in Children Who Have Sustained an Acquired
Brain Injury

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Abstract

Background: Childhood brain injury can result in cognitive, behavioural, and psychological difficulties. It is reported that many children who have suffered a brain injury experience the same level of emotional distress as children seen in mental health services. Cognitive behaviour therapy (CBT) has been shown to be an effective intervention for a range of psychological disorders that arise during childhood, yet to date there is little evidence to suggest whether this is a beneficial therapy for children with acquired brain injury (ABI). The current study explored whether children who have sustained an ABI have the necessary skills to engage in CBT, by assessing their ability to distinguish between and link thoughts, feelings and behaviours. Furthermore, performance on these tasks was investigated in relation to a number of cognitive functions thought to enhance an individual's ability to engage in CBT.

Methods: The study employed a between-subjects design comparing typically developing children ($n = 20$) and children who have sustained a brain injury ($n = 18$). Children were aged 8-12 years. Children completed two measures of CBT skill, a theory of mind (ToM) task, a brief measure of intelligence, and questionnaires relating to mood and metacognition. Parents also completed questionnaires relating to empathy, executive functioning, and their child's overall strengths and difficulties.

Results: Children with ABI demonstrated significantly poorer performance on the CBT skills tasks than typically developing children. Significant relationships were also found between empathy, ToM and performance on the tasks. However, contrary to the hypotheses, mental health/behavioural difficulties, executive functioning, and metacognition did not significantly impact on task performance.

Conclusions: This highlights that children with ABI may find engaging with CBT challenging. Continued research investigating the application of CBT for children with ABI would be valuable, as well as further exploration of how different cognitive functions impact on CBT participation.

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Chapter One

Introduction

1.1 Chapter Overview

This chapter begins with an introduction to paediatric acquired brain injury (pABI) including information about the epidemiology, neuropathology of damage and severity. This is followed by a discussion of the consequences of sustaining a pABI, including cognitive, behavioural and social outcomes; and in particular there will be a focus on the psychological outcomes. Next attention is turned to the treatment of childhood mental health problems, with specific consideration given to CBT as a treatment approach and the theoretical underpinnings of the model are briefly discussed. Additionally, the potential role that executive function, metacognition, theory of mind (ToM), and empathy might play in the assessment of CBT skill and in children's engagement in CBT based interventions is discussed, along with how these skills may be impacted on by brain injury. Finally, the literature related to the use of CBT to treat resultant or co-morbid mental health problems in individuals who have experienced an ABI is then presented. This includes an evaluation of both child and adult research and highlights outstanding areas to which future research could be directed. The chapter concludes with the research aims alongside the specific hypotheses to be tested.

1.2 Paediatric Acquired Brain Injury (pABI)

Acquired brain injury (ABI) refers to any injury to the brain which occurs after birth, including traumatic brain injury (TBI), tumour, stroke, and encephalitis to name a few (Arundine et al., 2012); and the term paediatric is defined as a child under the age of 18 years old. A common feature of these pathologies is the potential

for alteration in brain function, and consequent changes in the child's cognitive, emotional, behavioural and social functioning.

1.2.1 Epidemiology. Brain injury during childhood and adolescence is the biggest cause of mortality or permanent disability (Hawley, Ward, Long, Owen, & Magnay, 2003; World Health Organisation, 2009). However, it is difficult to obtain accurate figures regarding the prevalence of pABI as it incorporates a wide range of conditions with varying degrees of resulting deficits.

Nevertheless, it is known that TBI is by far the most common form of injury, with estimated incidence rates in the UK believed to range from 180 per 100,000 to over 300 per 100,000 (Hawley et al., 2003). Of these, approximately 81% will be mild injuries, 8% moderate, 6% severe and 5% fatal (Hawley et al., 2003). The literature suggests that males are typically more likely to sustain a TBI than females (Guerrero, Thurman, & Snizek, 2000; Lalloo & Sheiham, 2003); with high incidence rates reported in children under 5 years (Yates, Williams, Harris, Round, & Jenkins, 2006). Hawley et al. (2003) suggest that the most common causes of injury during childhood are falls, and road traffic accidents, often as a pedestrian. Research suggests that children who present at A&E with accidental injuries (including TBI) are more likely to be from socially deprived areas (Beattie, Gorman, & Walker, 2001; Haynes, Reading, & Gale, 2003; Reading, Langford, Haynes, & Lovett, 1999) demonstrate higher levels of pre-existing behavioural and emotional difficulties, live in single or step parent households (Lalloo, Sheiham, & Nazroo, 2003), or living in urban areas (Yates et al., 2006).

In comparison with TBI, other types of pABI are less prevalent. The reported incidence of stroke in children has increased over time due to improvements in imaging techniques (Lynch, Hirtz, DeVeber, & Nelson, 2002). The first population

based study of stroke in children found an incidence rate of 2.52 per 100,000 for all stroke types (Schoenberg, Mellinger, & Schoenberg, 1978). Following this, additional population-based studies have identified rates of ischemic stroke as high as 3.3 per 100,000 children, and actual rates are likely to be higher (Lynch et al., 2002). The reported incidence of acute encephalitis is between 3.5 and 7.4 cases per 100,000 (Granerod & Crowcroft, 2007). However, encephalitis is more common in children, among whom the incidence is >16 cases per 100,000 (R. T. Johnson, 1996). Cancer Research UK (2005) suggests the incidence rate of paediatric brain tumours is 5 per 100,000; however, as with the incidence rates for stroke it is likely that these figures are underestimated. Despite lower incidence rates of non-traumatic injuries, families and children affected still commonly experience significant and often long term consequences (Appleton, 1998).

1.2.2 Neuropathology following pABI.

As stated in section 1.2.1, traumatic injuries are the most common form of brain injury in children, and can result in either a closed head injury (where the skull is not penetrated) or an open head injury. The most common causes include motor vehicle accidents, abuse, falls and sports related injuries (Ylvisaker, 1998). When such incidents occur the brain is shaken around within the skull resulting in multiple injury sites, as well as diffuse axonal damage. In motor vehicle accidents for example, the brain accelerates forwards and then decelerates very rapidly. Primarily this results in contusions or haemorrhaging at the point of impact, but the linear and rotational shaking can also cause damage to cerebral areas opposite the site of damage. Research suggests that basal frontal regions and temporal lobes are particularly vulnerable to this form of damage (Bigler, 2007; Ylvisaker, 1998). Furthermore, this rotational force can cause damage to the long white matter tracts

which connect different areas of the brain, referred to as diffuse axonal injury (DAI; V. E. Johnson, Stewart, & Smith, 2013). The pathophysiology of TBI begins at the point of impact, however secondary injuries can occur in the days and weeks that follow as a result of the primary injury. In particular, swelling of the brain and raised intercranial pressure are particularly common in children (Kochanek, 2006). In injuries where the skull has been fractured, cerebral infections may also arise. Although secondary injuries are more responsive to medical intervention than primary injuries, they have been found to be predictive of poor outcome (Quattrocchi, Prasad, Willits, & Wagner, 1991).

The consequences of child TBI may be different from that observed in adults, as the immature brain responds differently to trauma. Research suggests that children are more likely to experience diffuse rather than focal injuries as the cranial bones are more flexible than in adulthood which may enhance the capacity of the skull to absorb a traumatic force (V. Anderson, Catroppa, Morse, et al., 2005). Other structural differences include a relatively larger head supported by a smaller neck increasing the susceptibility to rotational and shearing forces (Crowe, Catroppa, Babl, & Anderson, 2012); and neurons in younger children are comparatively unmyelinated compared to adults making them particularly vulnerable to the impact of injury (V. Anderson, Catroppa, Morse, Haritou, & Rosenfeld, 2005).

Vascular events, infection and tumours are other causes of brain injury in children. A stroke can result from the blood supply being cut off to a part of the brain, causing cells to be damaged or die (ischemic stroke); or bleeding in the brain (haemorrhagic stroke) which can increase the intercranial pressure and may require evacuation. A stroke typically results in more focal damage, and therefore presenting symptoms vary and are dependent on a number of factors such as the location of the

lesion, severity and age at the time of injury (Lynch et al., 2002). The impact of brain tumours is complex and depends on many factors including the tumour type, grade of malignancy, location of tumour, the age of the child and the treatment employed (Nortz, Hemme-Phillips, & Ris, 2007). As well as the primary damage caused by the tumour, neuropsychological sequelae are also associated with the treatment, such as surgery, chemotherapy or radiation therapy. Research suggests that radiation therapy in particular is associated with white matter changes, which can result in both global and specific cognitive impairments depending on the size and location of the area irradiated and the total dose administered (Fouladi et al., 2004; Mulhern et al., 2004).

1.2.3 Severity. It is important to be able to assess the potential severity of a head injury to guide prognosis and clinical management. The methods commonly used aim to classify injuries as mild, moderate or severe. In general terms, methods for assessing severity are based on observation of disturbance of consciousness (Wilson, Teasdale, Hadley, Wiedmann, & Lang, 1994).

Three classifications are used as part of routine clinical practice following a TBI. The first of these is the Glasgow Coma Scale developed by Teasdale and Jennett (1974). This scale considers three aspects of responsiveness – whether the eyes open, motor activity and what verbal behaviour occurs (Jennett, 1976). Individuals can score between three and 15 (with 15 being fully conscious). In general, it is accepted that a score of 13-15 suggests a mild injury, a score of 9-12 suggests a moderate injury, and a score of 8 or below suggests a severe injury (Parikh, Koch, & Narayan, 2007). The most accurate measure of GCS is thought to be upon admission to A&E; however this can be complicated by pre-hospital treatments such as intubation and sedation. For example, patients who are intubated prior to the initial GCS may be assigned a verbal score of one, which could

significantly overestimate the severity of injury (Marion & Carlier, 1994). In its standard form, this scale is not appropriate for young children and infants. Therefore it has been adapted for use with children in an attempt to compensate for their differences in verbal and motor capabilities (Kirkham, Newton, & Whitehouse, 2008; Reilly, Simpson, Sprod, & Thomas, 1988).

The other two common classification measures include the duration of loss of consciousness and post-traumatic amnesia (PTA), with a greater duration being associated with more severe injuries. Specifically, loss of consciousness for less than 30 minutes is classified as a mild injury, duration of 30 minutes to 24 hours suggests a moderate injury, and loss of consciousness for more than 24 hours is classified as a severe injury. With regards to PTA, less than one day suggests a mild injury, duration of one to seven days is considered to be a moderate injury, and more than seven days suggests a severe injury. The period of PTA is defined as the time between sustaining a head injury and the return of normal continuous memory (King et al., 1997). Despite well documented difficulties in measuring PTA, such as being underestimated due to “islands of memory” or overestimated due to the effects of medication, alcohol or drugs; it is still considered one of the best single predictors of outcome after head injury (King et al., 1997). However, it can be difficult to assess PTA in young children due to the need for retrospective reported memory loss.

With other forms of ABI, specific measures to assess severity are not used as routinely. Many different scales have been developed to assess stroke severity in adults (e.g. Toronto Stroke Scale, Oxbury Initial Severity Scale, and Cincinnati Stroke Scale); however the most validated and commonly used stroke impairment scale is the NIH Stroke Scale, which takes scores from individual elements of the neurological examination to provide an overall stroke impairment score (Williams,

Yilmaz, & Lopez-Yunez, 2000). Ichord et al. (2011) have developed a paediatric version of this scale for children aged 2-18, however this is not yet routinely available in clinical practice.

1.2.4 Outcomes following pABI. This section aims to highlight the range of consequences that can result from childhood brain injury, to provide a rationale for why investigating the efficacy of CBT with this population might be so important.

Evidence suggests that there are two phases of recovery following a childhood brain injury, the immediate phase (from the point of injury to approximately a year post injury) and a latent phase (from a year post injury onwards, potentially up to early adulthood). There has been a commonly held view that young children's brains are able to adapt and repair after a severe injury due to their plasticity. This view suggests that the earlier the insult, the better the functional outcome, particularly in the immediate phase. Devinsky, Perrine, Llinas, Luciano, and Dogali (1993) found that when focal injuries are sustained at a younger age there is a greater level of cortical reorganisation resulting in fewer cognitive deficits. However, a construct associated with cortical reorganisation is the "crowding" out of other functions. For example, research suggests that language is preferentially preserved at the expense of other functions. If an injury is sustained to the traditional left hemisphere language areas then equivalent areas of the right hemisphere are recruited for language, thus "crowding" out spatial functions that normally would have been mediated by these areas (Stiles, 2000). Furthermore, it is not clear that such principles apply when a generalised injury is sustained and there is little undamaged tissue to support cortical reorganisation.

Others oppose this view suggesting that the brain is in fact more vulnerable during childhood and that sustaining a brain injury is likely to interfere with the

trajectory of normal development (V. Anderson, Catroppa, Morse, et al., 2005; H. G. Taylor & Alden, 1997). It has been proposed that children who suffer a severe brain injury may be at risk of displaying what has been termed a “neurocognitive stall” during the latent phase of recovery. This is defined as a slowing in cognitive and social development beyond the first year post injury, despite what may have appeared to be a good recovery during the immediate phase (Chapman, 2006). Latent or delayed sequelae may become more apparent during adolescence as this stage of development is typically associated with substantial maturational changes in the frontal lobes. Therefore the effects of frontal lesions or disruptions to these networks as a result of diffuse injury may not become fully apparent until then, even if they occurred much earlier in life (Chapman, 2006).

The domains of function commonly affected by brain injury, such as information processing, executive functioning and memory involve complex neural substrates that are in a rapid state of development in early childhood, and are also particularly vulnerable to the impact of TBI. Damage to these networks reduces the child’s ability to learn from the environment and build upon their existing cognitive skills, which may have been limited due to age at the time of injury (Anderson & Yeates, 2014). This can affect not only cognitive development, but also social and emotional development. This theory of early vulnerability suggests that children “grow into” their deficits as they get older and they become less able to keep up with non-injured peers in terms of their development (Ross, Dorris, & McMillan, 2011). Furthermore, although outcomes from childhood brain injury vary considerably, it is generally accepted that the more severe the injury sustained, the greater the likelihood that children will experience long term impairments across a wide range of functional domains (V. Anderson & Catroppa, 2006).

1.2.4.1 Social consequences of pABI. Social interaction and friendship are of particular importance during childhood and adolescence, and are an essential component of emotional wellbeing, self-esteem and overall life satisfaction (Greenberg, Siegel, & Leitch, 1983; Raja, McGee, & Stanton, 1992). Sustaining a brain injury during this period can have significant detrimental impact on peer relationships, and increased social isolation from peers poses a considerable threat to children's mental health in both the short and long term (Ross, McMillan, Kelly, Sumpter, & Dorris, 2011). Poor parental and peer relationships are a vulnerability factor for the emergence of depressive disorder in children (Armsden, McCauley, Greenberg, Burke, & Mitchell, 1990); and developmental models of social anxiety have suggested that poor peer relationships contribute to the development of anxiety disorders (Rubin & Burgess, 2001).

Much of the research to date with children who have suffered a brain injury focuses on the specifics of peer relationships, such as how many friends the child has. For example, Prigatano and Gupta (2006) studied friendship in children aged 7 to 14 years old, and found that in the control group 75% reported having four friends or more, whereas only 39% of children with mild, 20% of children with moderate, and 14% of children with severe TBI had four or more friends. However, far fewer studies consider the quality of friendships in children with TBI, or the child's perspective. Those that have investigated the quality of relationships suggest that children with more severe TBI have greater difficulty managing conflict, co-ordinating play and developing intimacy in their closest relationships (Bohnert, Parker, & Warschausky, 1997). Janusz, Kirkwood, Yeates, and Taylor (2002) suggest that deficits in theory of mind, emotion recognition skills and social problem solving may account for these difficulties. They investigated social problem solving

skills in children aged 6 to 12 who had sustained a severe TBI, and found that the skills demonstrated were less developmentally advanced than children in an orthopaedic injury control group. These findings support a previous study by Warschausky, Cohen, Parker, Levendosky, and Okun (1997) who found that children with TBI generated fewer alternative solutions to hypothetical social situations in comparison with healthy controls, and their solutions were qualitatively different (e.g. less positive or assertive).

Tonks, Yates, Williams, Frampton, and Slater (2010) explored how peer-relationships and emotional distress after ABI may differ from the levels reported by healthy children or mental health controls. They found that children who had sustained an ABI demonstrated a significantly greater degree of peer-relationship difficulties compared with healthy controls, however there was no difference when compared with a sample of children accessing mental health services (CAMHS). These two groups also reported experiencing a similar level of emotional distress. Despite presenting with similar difficulties as the children in CAMHS, children with ABI do not have the same intervention services available to them (Tonks et al., 2010). This finding is particularly important given that children with ABI typically experience difficulties that endure into adulthood.

From a neuropathology viewpoint, Yeates et al. (2007) propose that the regions of the brain associated with social learning and behaviour may be particularly vulnerable to early insult. Studies of traumatic and non-traumatic focal lesions to the prefrontal cortex suggest more profound effects on social outcomes when the injury is sustained under 8 years of age, compared with in adulthood. Sonnenberg, Dupuis, and Rumney (2010) found that 80% of children who sustained a moderate to severe brain injury under the age of 4 years old were at considerable

risk of developing social problems when aged 8 compared with children who had sustained their injury later. This would continue to support the theory of early vulnerability outlined in section 1.2.4, and the suggestion that children “grow into” their deficits.

1.2.4.2 Behaviour consequences of pABI. New and persisting behavioural problems are estimated to affect 35% to 70% of children who have sustained severe TBI, impacting on their adaptive functioning and educational performance (Ylvisaker & Feeney, 2007). Behavioural disturbances may include inattention, disinhibition, poor self-regulation, rigidity, reduced insight and aggression. Behaviour change of this kind is often more problematic and concerning for parents than cognitive deficits (Gainer, 2006). It is suggested that pre-injury behavioural adjustment difficulties are a predictor of TBI (due to increased risk taking behaviour); thus increasing the prevalence of behaviour problems post injury (Schwartz et al., 2003).

Several studies have investigated the prevalence and predictive factors of developing secondary ADHD (SADHD) following a TBI. Two studies followed the same cohort of children aged 5 to 14 years of age (who had no preinjury diagnosis of ADHD), and assessed predictive factors within the initial 6 months (Max et al., 2005a) and from 6 to 24 months post injury (Max et al., 2005b). It was found that 16% developed SADHD in the first 6 months, increasing to 21% in the second year after injury. Injury severity and socio-economic status (SES) were found to be significant predictors of the development of SADHD. Although this is one of the largest prospective studies, it is limited by the lack of an orthopaedic injury comparison group. This would have helped to control for new-onset ADHD in children predisposed to, and exposed to injuries. Alternatively a control group of

uninjured children with primary ADHD would have enabled the pattern of ADHD symptoms arising from TBI to be compared with a developmental aetiology.

A further study conducted by Max et al. (2004), incorporating a wide range of measures and a control group, demonstrated a clear association between injury severity and the onset of SADHD. Almost one third of children with severe TBI developed SADHD, and this was independent of whether the child had symptoms of ADHD prior to the injury. SADHD was associated with significant impairment in intellectual and adaptive function across all levels of injury severity. However, it was also noted that this was not necessarily a permanent difficulty and had resolved in one third of participants by 18 months post injury. Psychiatric labels such as ADHD are descriptive but do not necessarily explain the underlying cause. It could be questioned whether this is a helpful or appropriate label to attach to a child following brain injury as many of the symptoms associated with ADHD overlap significantly with the complex neurocognitive and behavioural consequences commonly experienced after brain injury. It could be suggested that children with brain injury are at more risk of attracting labels such as ADHD or autism, primarily because these conditions are better understood by services such as CAMHS.

Many of the studies investigating behavioural difficulties following TBI suggest that environmental factors and family functioning are a key moderating factor. H. G. Taylor et al. (2002) conducted a four year follow up study and found that long term decline in academic performance was only found in children from more disadvantaged backgrounds. Furthermore, across the follow up more behavioural sequelae in children with TBI were associated with lower SES. Findings from longer term follow-ups of children with TBI suggest that despite at least partial recovery in cognitive functions, behavioural sequelae often do not resolve over time

and may persist into adulthood (Klonoff, Clark, & Klonoff, 1993). In a study by Leon-Carrion and Ramos (2003) the histories of violent and non-violent prisoners were compared. The findings suggest that untreated childhood brain injury is a factor in predisposing an individual to violent crime in adulthood.

1.2.4.3 Cognitive consequences of pABI. Cognitive deficits experienced after pABI can have a negative impact on many areas of a child's life, and often play a significant role in the behavioural, academic and social difficulties outlined above. Frequently reported impairments include problems with speed of processing (Babikian & Asarnow, 2009); memory and learning (Levin et al., 1988); attention (V. Anderson & Pentland, 1998; Dennis, Wilkinson, Koski, & Humphreys, 1995); and communication (Catroppa & Anderson, 2004; Ewing-Cobbs et al., 2012). General intellectual functioning is also commonly impacted upon following brain injury with research indicating that children with ABI frequently demonstrate significantly poorer performance on measures of intelligence than normative samples (V. Anderson, Catroppa, Morse, Haritou, & Rosenfeld, 2009; Crowe, et al., 2012). Persistent deficits in IQ appear to be especially likely among children with severe brain injury and those injured early in life (Anderson & Yeates, 2014).

As reported previously, it is likely that with fewer established cognitive skills children who experience brain injury at a younger age are likely to experience more severe and persistent impairments. Other areas of potential deficit include executive functioning (Levin & Hanten, 2005; Levine et al., 2000; Todd, 1996); theory of mind (Bibby & McDonald, 2005); metacognition (Hanten, Bartha, & Levin, 2000); and the development of empathy (Tonks et al., 2009). These particular areas of cognitive functioning are being explored in the current study in relation to performance on tasks assessing CBT skills. Therefore the developmental trajectory, potential role in

CBT, and difficulties that may arise following pABI with regards to these abilities will be explored in more depth in sections 1.6 and 1.7.

1.2.4.4 Psychological consequences of pABI. As the current study is exploring whether children who have sustained a brain injury have the skills thought to be necessary to engage in CBT, it is important to first consider the psychological consequences which are commonly experienced following brain injury for which children might be seeking therapy.

Research investigating the prevalence of internalising disorders following childhood brain injury has grown over recent years, although it still remains relatively sparse in comparison with the adult literature. Due to traumatic brain injury being the most prevalent type of injury, much of the research has focused on this group. There is comparatively less available evidence considering other types of acquired brain injury, and the current literature tends to explore the impact on quality of life more broadly, rather than specific psychological disorders. It is important to understand the psychological consequences following brain injury, as there is consistent evidence demonstrating that mood disorders can have a detrimental impact on the long term recovery of ABI patients (Klonoff et al., 1993; Rosenthal, Christensen, & Ross, 1998).

Many of the disorder specific studies to date have focussed on post traumatic stress disorder (PTSD), rather than anxiety disorders more broadly because of its implicit relationship to trauma. However, diagnosis of PTSD after a traumatic head injury can be a contentious issue due to the presence of amnesia. Without memory of the event, some would argue that it is not possible to meet the full criteria for a diagnosis of PTSD (Gerring et al., 2002). To complicate the picture further, some of the symptoms of PTSD overlap with the neurologic sequelae of brain injury making

it more difficult to make a differential diagnosis (Gerring et al., 2002). Despite this, even with the presence of amnesia, PTSD has been reported in both adults (R. A. Bryant, Marosszeky, Crooks, & Gurka, 2000; Levin et al., 2001; McMillan, 2001) and children (Gerring et al., 2002; Kenardy et al., 2012; Levi & Drotar, 1999; Max, Castillo, et al., 1998) following a brain injury. Levi and Drotar (1999) compared children with moderate to severe TBI and an orthopaedic injury (OI) control group at 6 and 12 months post injury. Parents and children in the severe TBI group reported higher levels of post traumatic stress symptoms (PTSS) than the moderate TBI or OI groups at the follow ups. Less compelling evidence was found by Max, Castillo, et al. (1998) who reported that only two participants developed full PTSD, both of which had resolved by the 3 month follow up. However, it was much more common for individuals to experience at least one PTSD symptom (68%) in the first 3 months rather than meeting full diagnostic criteria. A more recent study by Kenardy et al. (2012) extended previous work by incorporating a more rigorous assessment of PTSD designed specifically for use with children. A longitudinal design was employed with children being followed up at 2, 3, 6, 12, and 18 months post injury. Results suggested that children with TBI and PTSD did not experience as much psychosocial recovery as those without PTSD, although this finding was not significant.

Another specific post injury disorder reported in the literature is obsessive compulsive disorder (OCD). Grados et al. (2008) examined new onset of obsessions and compulsions within one year of severe paediatric TBI, and found that they were reported by approximately a quarter of the sample. The most common worries were around disease, cleanliness, and behaving inappropriately. However, the measure used to explore obsessive compulsive symptoms (OCS) was somewhat limited, and

therefore the full range of the condition was not studied. This limitation probably resulted in an underestimation of the rate of OCD. A case study of an adolescent who developed OCD following a severe traumatic injury, suggested that the disorder may be a direct result of the neurological damage caused by the brain injury (Max et al., 1995).

There have been a number of studies which have started to investigate the nature and predictive factors of anxiety and mood disorders more broadly following a TBI. Jeffrey Max is a prominent figure in this field and has conducted numerous studies investigating the onset of 'novel' psychiatric disorders following TBI, with varied findings. Firstly, he reports that children are more likely to develop an externalising disorder rather than an internalising disorder (Max, Lindgren, Knutson, et al., 1997). This is supported by D. R. Bloom et al. (2001) who found that ADHD was the most common new onset disorder. Secondly, a common association between injury severity and new onset disorders is highlighted, with higher rates being reported by children with more severe injuries in comparison to controls or children with mild injuries (Luis & Mittenberg, 2002; Max, Koele, et al., 1998). However, in contrast to comparisons with OI control groups, very little difference was seen between children with and without history of TBI in a psychiatry inpatient unit (Max, Sharma, & Qurashi, 1997).

From these studies it appears that three key predictive factors are commonly highlighted. These include injury severity, the presence of a preinjury psychiatric disorder, and psychosocial adversity/family functioning (Max, Lindgren, Robin, et al., 1997; Max, Robin, et al., 1997; Max, Smith Jr, et al., 1997). Max et al (2011) also identified younger age at time of injury to be a significant risk factor for developing a novel anxiety disorder post TBI. This finding was supported by Vasa et

al. (2002), and this provides further support for the theory of early vulnerability. However, many of these studies are limited by a lack of standardised measures used to assess anxiety and mood disorders, and parental report is a common outcome measure. This is problematic as it can lead to bias, and reliance on parent-reported data for internalising disorders can lead to symptoms which are not evident to the parent being missed. A further limitation of many of these studies is that individuals often did not meet DSM criteria. Consistency of diagnostic criteria use in the TBI literature is vital as effective treatment interventions, derived from non-brain injured populations, may be used on the basis of this diagnosis (Van Reekum, Bolago, Finlayson, Garner, & Links, 1996).

Relatively few studies have examined the onset of depression in children following a brain injury, and those that have report a low incidence rate. A study by Hawley (2003) identified that only 4 children out of sample of 97 were confirmed as experiencing depression, all of whom were in the moderate/severe injury group. Similar findings were reported by Max et al. (2012). Of 138 participants, only 15 were found to have a new onset of definite or subclinical depressive disorder at 6 months post injury. In contrast to anxiety disorders, Max et al. (2012) reported that older age of injury was associated with the onset of depression. Those who sustained their injury at 12 years of age or older were five times more likely to develop depression than those who sustained their injury under the age of 9 years. Kirkwood et al. (2000) also explored depressive symptoms following TBI and reported that across groups, and varying length of follow up, means consistently fell in the normal range suggesting most children in the sample did not display clinical levels of depression. These findings are interesting and perhaps contrary to what might be expected. Problems with insight are common following brain injury, and as a

consequence the extent of an individual's difficulties are not always recognised (Bond, 2008). Furthermore, it was briefly highlighted in section 1.2.4.3 that memory impairments are common following brain injury (Levin et al., 1988). It could be suggested that over generalised or poor memory may lead to negative symptoms being under reported on formal measures; and therefore may not always provide an accurate reflection of the problems being experienced.

1.3 Interim Summary

In summary, a range of consequences, including psychological, social, behavioural and cognitive can arise following paediatric brain injury. As highlighted in section 1.2.4 there is an argument that children may “grow into” their deficits or experience “neurocognitive stall” as they struggle to acquire new skills and meet later emerging cognitive milestones. There is also evidence that children with brain injury experience the same level of emotional distress as children seen in mental health services. Therefore, there is a need for effective interventions for children who have suffered an ABI. The next chapter is going to explore the use of cognitive behavioural therapy (CBT). When considering the types of skills which might be required to engage in CBT the individual is likely to need a degree of capacity to access, understand and reflect on thoughts and feelings; the capacity to remember the key content of the sessions; and to be able to apply what has been learnt in the heat of the moment. However, as outlined above, many of these skills (such as insight, emotion regulation, memory, social skills, and other aspects of cognitive functioning) are vulnerable to injury and likely to be affected, which may make engaging in CBT more challenging.

Before considering how this might apply to children with brain injury, it is important to first consider the suitability, application and effectiveness of CBT for treating psychological disorders in typically developing children.

1.4 Cognitive Behavioural Therapy (CBT)

This section will begin with a brief overview of the theoretical basis and application of CBT, before highlighting the efficacy, developmental considerations, and adaptations needed for typically developing children.

1.4.1 Theoretical underpinnings and application of CBT. Modern CBT has two main influences: behaviour therapy developed in the 1950's and 1960's (Wolpe, 1958); and cognitive therapy developed by A.T Beck (1967, 1979). Cognitive theory suggests that psychological disorders do not arise from events per se, but from the meanings individuals give to events, based on schemas which they have already developed through life experience. The first cognitive model was developed in the context of depression (Beck, 1979). It was proposed that there are different types of cognition, including negative automatic thoughts (NATS), underlying assumptions which may influence the meaning an individual attributes to a situation, and core beliefs which are rigid and enduring beliefs one holds about themselves, others and the world. These beliefs, or schema, which people hold bias the kind of information individuals attend to, store, and retrieve from memory. Dysfunctional schema increases an individual's vulnerability to emotional disorder, and contributes to its maintenance.

Despite asserting the centrality of cognition, Beck nevertheless recognised the importance of some aspects of behaviour therapy. In particular he acknowledged that changing behaviour is a particularly powerful method of achieving cognitive and affective change. By incorporating behavioural techniques, such as those based on

learning theory, cognitive therapy further developed into CBT (Bennett-Levy et al., 2005).

Although originally developed for the treatment of depression, over the years CBT has since been adapted for use with a wide range of disorders. These include specific models for the treatment of OCD (Salkovskis, 1985), PTSD (Ehlers & Clarke, 2000), GAD (Wells, 1995), eating disorders (Cooper, 2003; Fairburn, Shafran, & Cooper, 1999), bipolar disorder (Basco & Rush, 2005), psychosis (Fowler, Garety, & Kuipers, 1995), and personality disorders (Beck, Freeman, & Davis, 2006; Layden, Newman, Freeman, & Morse, 1993). In addition, CBT has been adapted for use with a wide range of clinical populations including children and young people (Stallard, 2002), individuals with learning disability (Willner & Hatton, 2006), and older adults (Laidlaw, Thompson, Gallagher-Thompson, & Dick-Siskin, 2003). As the demands of mental health services have also changed, requiring more cost effective methods, CBT has been adapted to be delivered in a range of ways and not just in individual therapy. For example, it can be delivered over the telephone (Bee et al., 2008; Clark et al., 2009; Lovell et al., 2006), via computer and internet based formats (Andersson, 2009; Spek et al., 2007), and in groups (Barrett, 1998; Oei & Dingle, 2008).

Cognitive behaviour therapy is one of the most extensively researched forms of psychotherapy. The growth in the literature is, in part, due to the ongoing adaptation of CBT for a wide range of disorders as highlighted above. In an extensive review of the literature regarding CBT for adults Butler, Chapman, Forman, and Beck (2006) combined 16 rigorous meta-analyses with the aim of exploring how effective CBT is in comparison to other psychological and pharmacological interventions, and how lasting the effects of CBT are. The authors

conclude that CBT is highly effective for a wide range of disorders, and that benefits are frequently maintained for substantial periods beyond the cessation of treatment. This extensive body of literature has resulted in CBT being recommended by the National Institute of Health and Clinical Excellence (NICE) to treat a range of disorders.

However, although the evidence base for CBT is rapidly growing, its efficacy is not without debate. CBT is a structured therapy and therefore lends itself more readily to being evaluated in comparison to other therapy approaches. A large number of meta-analytic studies have been conducted to examine the effectiveness of CBT and other psychotherapies, comparing adults with depression with control groups. Of these reviews, many have found moderate to large effect sizes (Churchill et al., 2002; Cuijpers, Van Straten, Warmerdam, & Smits, 2008; Gaffan, Tsaoasis, & Kemp-Wheeler, 1995; McDermut, Miller, & Brown, 2001); however Cuijpers, Smit, Bohlmeijer, Hollon, and Andersson (2010) argue that these effects may be overestimated because of publication bias. This is the tendency for studies that show a statistically significant treatment effect to have increased publication rates, and this can threaten the validity of meta-analytic reviews.

Additionally there is an ongoing difficulty when trying to compare and contrast treatment outcomes for different types of psychotherapy. A review of 17 meta-analyses found small or non-significant effect sizes when comparing different types of active psychotherapy, including CBT (Luborsky et al., 2002). When the effects of therapeutic alliance were removed, the differences between treatments were reduced even further. Luborsky et al. (2002) propose that the most likely reason for this is that the processes and components the different therapies have in common (such as therapeutic alliance) are the most significant in predicting outcome.

Although identifying which factors account for patient improvement has proved difficult, therapeutic alliance consistently emerges as a strong contributor (Horvath & Luborsky, 1993; Martin, Garske, & Davis, 2000). This has led many to conclude it is an essential aspect of therapy, and further supports Luborsky's (2002) hypothesis.

1.5 CBT for Typically Developing Children

Negotiating a successful path through childhood can be difficult, with the child aiming to strike a balance between developing independence, competence, appropriate social behaviour and an ability to engage in self-control, all while trying to comply with adult rules. During this time the child is beginning to develop a sense of self, and acquiring coping skills to help them adjust to the demands of different environments. This can be challenging for children, and not all are able to manage this successfully (Kendall, 1993). Indeed it is estimated that 1 in 10 children and young people in the UK aged 5 – 16 suffer from a diagnosable mental health disorder (Green, McGinnity, Meltzer, Ford, & Goodman, 2005; Snell et al., 2013).

Following the reported success of CBT for adults, research began to focus on its efficacy for treating childhood disorders. It is now one of the most widely researched child therapies, and a number of reviews suggest that it is an effective intervention for a wide range of psychological disorders that arise during childhood (Cartwright-Hatton, Roberts, Chitsabesan, Fothergill, & Harrington, 2004; Grave & Blissett, 2004; Kendall & Panichelli-Mindel, 1995). CBT aims to address some of the challenges that can arise during childhood with a focus on teaching adaptive coping skills and increasing self-efficacy (Kendall & Panichelli-Mindel, 1995). Furthermore, CBT has the potential to prevent the development of dysfunctional schema as the intervention takes place as the child is simultaneously developing their view of themselves, others and the world (Reinecke & Clark, 2003).

The next section of this chapter will continue with an overview of developmental cognitive theory and how CBT has been adapted for children. The efficacy of using CBT with typically developing children will then be considered.

1.5.1 Developmental considerations. Throughout childhood, children's emotional, physical and cognitive abilities and understanding are constantly evolving. Research from the field of developmental psychology makes it possible to examine the relationship between cognitive capacities of children at different stages in relation to the demands required by the CBT process. Piaget (1952) has greatly influenced how cognitive development in children is viewed, following his stage model of intellectual functioning. He proposed there are four key stages, which include the sensory-motor, (0-2 years), pre-operational (2-7 years) concrete operational (7-12 years) and formal operational (12 years and above). Piaget's model suggests that children assimilate and accommodate new information from their environment into existing schemas. Furthermore, Piaget assumes this is a hierarchical process, with a child needing to be competent in one stage before progressing to the next.

However, Piaget's model has been criticised for being too inflexible and stage bound (Brown & Desforbes, 1977), which has led to current thinking moving away from a rigid stage model. Instead it is now viewed as a more gradual and fluid process with children moving both within and between stages. In general, it is felt that Piaget underestimated the abilities of the preoperational child and overestimated the achievements of the later stages (Meadows, 2012). Based on Piaget's model, children do not develop the ability to consider abstract concepts, or reflect and manipulate ideas until the age of 12, which would suggest children under this age would lack the ability to engage in CBT. However, this does not fit with the current

literature as many studies have highlighted that children younger than this can reflect on their cognitive processes, and can discriminate between thoughts, feelings and behaviours (Flavell, Flavell, & Green, 2001; Quakely, Coker, Palmer, & Reynolds, 2003a; Spensley & Taylor, 2000).

Another influential theory of cognitive development was provided by Vygotsky (1962). In contrast to Piaget, Vygotsky placed considerably more emphasis on the role of social interaction and language contributing to cognitive development. He introduced the concept of the zone of proximal development (ZPD), which he defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p.86). The ZPD has become synonymous in the literature with the term scaffolding, although this term was actually introduced by D. Wood, Bruner, and Ross (1976). Once the child, with the benefit of scaffolding, masters the task, the scaffolding can be removed and they will then be able to complete the task again on their own. Applying these principles to therapy, it has been suggested that age appropriate adaptations and guidance from the therapist can provide the scaffolding children need in order to enhance their ability to engage in CBT (Reynolds, Girling, Coker, & Eastwood, 2006). The types of adaptations used are outlined below.

1.5.2 Adapting CBT for use with children. Although there is ongoing uncertainty regarding the theoretical underpinnings of CBT for children, there is general agreement that it needs to take into account the child's developmental stage, and be integrated within a wider developmental approach (Grave & Blisset 2004; Stallard, 2002). Some models of CBT for specific disorders are not always appropriate for children across all developmental stages, and therefore creative

adaptations need to be made in the way interventions are delivered to make them accessible (Graham & Reynolds, 2013).

Research generally suggests that using visual stimuli enhances the understanding of CBT concepts with younger children. For example, Scheeringa, Weems, Cohen, Amaya-Jackson, and Guthrie (2011) evaluated a 12-session trauma-focussed CBT intervention with 3 to 6 year old children. It was felt that none of the 3 year olds had understood the verbal description of PTSD, but two-thirds did when the concept was explained using cartoons. Additionally, their ability to identify emotions doubled when drawings were used.

Other types of adaptations have also been found to be effective. For example using stories can help children to understand how problems develop, and using puppets can help children to explore potentially important cognitions and develop coping skills (Hirshfeld-Becker et al., 2008). A further example is provided by Freeman et al. (2008) who explored family based CBT for children aged 5 to 8 with OCD. They made adaptations to account for developmental stage and levels of cognitive, social and emotional skills; such as using specific, concrete and familiar examples. The rationale for exposure response prevention (ERP) was described as “taking a medicine that tastes yucky but makes you feel better” (p.594), and obsessional thoughts were differentiated from other types of thoughts by describing them as “having a song stuck in your head” (p.594).

For children over the age of 7, a mix of verbal and non-verbal techniques need to be employed to make the therapy interesting and engaging. It is not uncommon that children are unable to spontaneously identify and report their cognitions. To facilitate this it can be helpful to ask them what another child in a similar situation might think, or to use thought bubbles, cartoons or quizzes (Kane &

Kendall, 1989). The process of cognitive restructuring can also be challenging for children (Spence, Donovan, & Brechman-Toussaint, 2000), although the process can be simplified by providing more specific and concrete cognitive strategies. For example, children can be encouraged to practice catching the ‘red’ thoughts and replacing them with more adaptive ‘green’ thoughts. Furthermore, to present complex or abstract ideas in a more understandable way, metaphors are commonly used. These metaphors can then be extended to become coping strategies (Graham & Reynolds, 2013). With all of these adaptations, it is important that they match the child’s developmental stage and not just their chronological age.

In addition to highlighting adaptations that can be made within therapy, research has also investigated children’s ability to demonstrate core skills necessary to engage in CBT by developing a series of tasks. The Card Sort Task (CST) has been used in a number of studies to date and assesses young children’s ability to distinguish thoughts, feelings and behaviours (Quakely et al., 2003; Quakley, 2002; Quakley, Reynolds, & Coker, 2004; Reynolds et al., 2006). The task comprises of six short stories, each of which contains a ‘doing sentence’, a ‘thinking sentence’ and a ‘feeling sentence’, and it can be administered both with and without visual cues. The cue condition includes using glove puppets to represent the focal characters in the stories, and the participating child is asked to help the glove puppets by posting each sentence card into one of three posting boxes. Each box is labelled with “feeling sentences”, “thinking sentences” or “doing sentences”, and has a picture associated with these activities (such as a thought bubble). Quakley et al. (2004) used this task on children aged 4 to 7 years old, and found that children of all ages who were given simple cues were more successful in discriminating among thoughts, feelings and behaviours. It is believed that success on these tasks is likely

to predict successful engagement in CBT, and therefore provides further evidence to suggest that young children can engage in cognitive therapy if age appropriate adjustments are made.

This task was also used to assess CBT ability in children deemed to be ‘at risk’ of mental health problems in comparison to children at ‘low risk’ (Reynolds et al., 2006). The findings highlighted that children ‘at risk’ of mental health difficulties were significantly less able to discriminate thoughts, feelings and behaviours than those considered to be at ‘low risk’. This has important implications as it suggests that it is children with mental health problems, (the intended recipients of CBT), who are less likely to gain as much benefit from the therapy. Furthermore, the CST has also been successfully used to assess CBT skills in adults with intellectual disabilities (Bruce, Collins, Langdon, Powlitch, & Reynolds, 2010; Sams, Collins, & Reynolds, 2006).

Other tasks have also been developed to assess CBT skill, including tasks which explore children’s ability to link thoughts to feelings and thoughts to behaviours. One such task was developed by Quakley (2002) and comprises of eight short illustrated stories. Children are asked to explain why a focal character experiences a particular emotion or performs a certain action at the end of the stories, when they have seen a cue which reminds them of a previous experience. This task was presented to children aged 4 to 7 years, and it was found that their performance significantly increased with age. A similar task was used by Doherr, Reynolds, Wetherly, and Evans (2005), assessing children aged 5 to 7 years old. They reported similar findings to previous studies, with the majority of the children demonstrating they could link thoughts to feelings, as well generate post-event attributions, and identify emotions. Many of these studies have highlighted a significant association

between IQ, age and performance on the CBT tasks (Doherr et al., 2005; Quakley et al., 2004; Reynolds et al., 2006).

These tasks suggest that even young children may possess skills necessary to engage in CBT. The CST, thought to feeling link task and thought to behaviour link task have been employed in the current study to assess whether children who have sustained a brain injury have the core skills thought to be necessary to successfully engage in CBT. The tasks are described in further detail in sections 2.6.1.1 and 2.6.1.2.

1.5.3 Efficacy of CBT with children. The research investigating the effectiveness of CBT with children has been reviewed in several comprehensive meta-analyses, and overall the evidence suggests that CBT is an effective therapy for internalising disorders. A number of key reviews have looked at the effects of psychotherapy for the treatment of depression in children and adolescents. The first of these, conducted by Reinecke, Ryan, and DuBois (1998) included six studies all using CBT, and reported a mean effect size across studies of 1.02. Even after using an alternate computational method, a mean effect size of .97 was reported which is significantly higher than Cohen's widely used benchmark of .80 for a large effect. Two further meta-analyses reported similar findings (Lewinsohn & Clarke, 1999; Michael & Crowley, 2002). In a more recent, rigorously conducted meta-analysis Weisz, McCarty, and Valeri (2006) reviewed a large sample of studies and reported a much lower mean effect size of .34. Such a disparity suggests that any conclusions with regards to treatment efficacy for depression should be made cautiously.

A number of reviews have also investigated the effectiveness of CBT for childhood anxiety disorders. The most recent of these reviews was conducted by Reynolds, Wilson, Austin, and Hooper (2012), which included 55 randomized

controlled trials of psychological therapies for children and adolescents, aged 2 to 19 years. The majority of the studies employed CBT, and moderate effect sizes were reported overall. However, there were seven studies which utilised other psychological therapies for the treatment of PTSD (EMDR, a psychosocial intervention, narrative therapy, and trauma specific psychotherapy) in which non-significant effects were found, suggesting these therapies are less effective for treating anxiety than CBT. Additionally, effect sizes were small to medium when CBT was compared with an active control condition compared to a wait-list control group, indicating that development and refinement of CBT is important to maximise treatment efficacy. Other reviews investigating CBT for childhood anxiety disorders have reported similar findings (Cartwright-Hatton et al., 2004; Davis, May, & Whiting, 2011; Ishikawa, Okajima, Matsuoka, & Sakano, 2007).

The substantial evidence base for CBT as a treatment for childhood internalising disorders, has led to its recommendation by NICE guidelines for conditions such as depression, social anxiety and OCD (2005a, 2013, 2005b, respectively). However, there is less compelling evidence for the use of CBT alone for externalising disorders such as conduct disorder and ADHD. Bennett and Gibbons (2000) conducted a meta-analysis of 30 studies comparing CBT for anti-social behaviour with control groups. Small to moderate effect sizes were reported, with CBT proving more effective with adolescents and older children. Studies investigating treatments for children with ADHD tend to focus on medication, making it difficult to assess the potential efficacy of using CBT (Klassen, Miller, Raina, Lee, & Olsen, 1999). Grave and Blissett (2004) highlight that many of the developmental characteristics of externalising disorders, such as reduced empathy and theory of mind in conduct disorder, and impaired executive functioning in

ADHD, may explain the limited effectiveness of CBT with these populations. It appears that the specific deficits for which they are seeking help, are also likely to impact on their ability to engage in CBT (Grave & Blissett, 2004).

1.5.4 Critique of CBT with children. Whilst the evidence in support of the use of CBT has increased substantially over recent years the approach is not without criticism. CBT interventions are based upon testable theoretical models that highlight the links between behaviour, emotions and cognitive processes. There is currently a lack of well-developed theoretical cognitive frameworks for understanding many childhood problems, resulting in an abundance of varied interventions (Stallard, 2002). Graham (1998) highlights that it can be difficult to identify the core and shared elements of CBT programmes for children, due to the wide and diverse range of techniques that are used. This lack of treatment specificity leads to confusion as to what cognitive behaviour therapy with children actually is, and makes the question of whether it is an effective treatment for this population a difficult one to investigate (Stallard, 2002).

An additional problem when evaluating CBT for children is that there are substantial differences in the emphasis placed upon cognitive and behaviour aspects, and it can often be difficult to identify the cognitive component. CBT for childhood anxiety typically relies heavily on education and behavioural exposure. For example, The Coping Cat Workbook (Kendall, 1990) is a 16 session treatment manual which consists of eight sessions of psychoeducation, followed by eight sessions which are behavioural in nature getting the child to face their fears using a graded hierarchy. It also incorporates behavioural elements such as relaxation, modelling, role-playing and social reinforcement (Beidas, Benjamin, Puleo, Edmunds, & Kendall, 2010).

It is important to establish the relative contribution of the cognitive aspect of therapy with children, as it appears that the mechanism of change is more often the behavioural component. This would suggest that it is therefore more of an extension of behaviour therapy rather than true CBT (Quakely et al., 2003a).

Another topic of debate has been the use of CBT with children younger than 7 years old. Spence (1994) suggests that there is uncertainty around whether the success of the treatment is impacted on by the child's age and developmental stage. Younger children are less developmentally mature and may struggle with the more abstract skills involved in therapy, such as discriminating between thoughts, feelings and behaviours. Additionally they may lack sufficient cognitive and emotional knowledge to reflect on these, and examine cause-effect relations between them (Grave & Blissett, 2004; Reynolds et al., 2006). In general, research suggests that children over the age of 7 benefit more from CBT than children under 7 (Reynolds et al., 2012). In a meta-analysis conducted by Durlak, Fuhrman, and Lampman (1991) the effect size for children aged 11-13 (0.92) was almost twice that for children at less advanced cognitive stages (0.57 for ages 5-7; 0.55 for ages 7-11). However, preliminary findings have highlighted significant treatment effects for CBT with children as young as three years old (Freeman et al., 2008; Hirshfeld-Becker et al., 2010; Scheeringa et al., 2011).

1.6 What Cognitive Skills May be Needed to Engage in CBT?

The literature so far has highlighted that a range of interventions are encompassed under the broad term of CBT for children. Assessment of children's suitability for CBT requires further development, as it is not yet known which skills are necessary prerequisites for successful engagement in therapy (Quakley, 2004). It is proposed that to engage in CBT it is necessary to understand the cognitive model, be

able to think about thinking, recognize that thoughts, feelings and behaviour are different concepts, and understand that they are inter-related (Doherr et al., 2005). To enhance performance in these activities it is thought that theory of mind, empathy, metacognition and executive function skills may be important (Diamond, 2006; Flavell et al., 2001; Mohlman & Gorman, 2005; J. J. Wood et al., 2009). This next section will provide a brief outline of the developmental trajectory of these skills, how they relate to CBT, and how development of these skills may be affected by sustaining a childhood brain injury.

1.6.1 Development of theory of mind and the role in CBT. Theory of mind (ToM) broadly refers to the ability to make inferences about the emotions, beliefs and desires of other people (Baron-Cohen, Leslie, & Frith, 1985). A central focus of the research has been on children's understanding of belief, in particular false belief. Understanding mental states requires the realization that these are internal processes which are distinct from real world situations or events. Therefore an individual's belief is a representation of their internal mental state, and may not reflect reality. Theory of mind ability develops with age, and performance on false belief tasks such as the Sally-Anne task, are often used as the primary outcome measure. (Wellman, Cross, & Watson, 2001). Demonstration of success in these tasks is thought to suggest that the child is able to understand the distinction between the mind and external world (Estes, 1994).

Research on the development of ToM presents contradictory findings. There are authors who argue that ToM is present before the age of 3 years (Carruthers, 2013; He, Bolz, & Baillargeon, 2011) and others who suggest that an understanding of mental states is innate (Baron-Cohen, 1997; Legerstee, Barna, & DiAdamo, 2000). However, there is a general consensus in the literature that by the age of 5 to

6 normally developing children can understand a person's actions in terms of desires, thoughts, beliefs and emotions (Cutting & Dunn, 1999). By this age normally developing children are able to complete false belief tasks such as the Sally-Anne task (Baron-Cohen, Leslie & Frith 1985). Liddle & Nettle (2006) investigated theory of mind in normally developing children aged 10 and 11 years old and found that approximately 80% of their sample correctly completed age appropriate first and second order tasks, highlighting that ToM continues to develop with age.

The role that ToM might play in an individual's ability to engage in CBT is outlined below in section 1.6.2, in combination with the role of empathy.

1.6.2 Development of empathy and the role in CBT. Humans are fundamentally social beings, and empathy is a key skill in developing social interactions. The construct of empathy is complex, but simplistically it can be defined as the ability to feel or imagine another's emotional experience (McDonald & Messinger, 2012). Empathy includes both cognitive and affective components. The cognitive aspect shares similarities with ToM, being described as the ability to understand a distressing situation and recognise another person's perspective and emotional response (Knafo, Zahn-Waxler, Van Hulle, Robinson, & Rhee, 2008). Theory of mind and empathy are often used interchangeably in the literature, but evidence from social cognitive neuroscience suggests that these are distinct abilities which rely on different neuronal pathways (Singer, 2006). The affective aspect of empathy involves actually experiencing the emotion that another is expressing.

The emergence of empathy is present from the first few days of life and continues to develop with age. Research with infants suggests that babies cry in response to the sound of another newborn crying, and this may reflect the precursor for developing empathic feelings (Sagi & Hoffman, 1976). In the first year of life,

this response of experiencing personal distress in response to others' distress continues. Following this, the child begins to differentiate between self and others, and therefore moves towards demonstrating concern rather than experiencing personal distress. Toddlers will often start to display comforting behaviours intended to alleviate distress (McDonald & Messinger, 2012; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). As children progress into early childhood, prosocial behaviours continue to develop and become more appropriate, and are accompanied by attempts to comprehend the nature of the distress (Zahn-Waxler et al., 1992).

There is a body of literature highlighting the importance of therapist empathy in therapeutic outcomes (Thwaites & Bennett-Levy, 2007), but there is a distinct lack of research exploring whether client empathy and ToM impact on their ability to engage in CBT. Some evidence can be drawn from the poor treatment effects of CBT for children with externalising disorders. As mentioned previously, research suggests that deficits in empathy and ToM are associated with conduct disorder, and ADHD is associated with impaired executive functioning. Furthermore, it is useful to turn to the literature on children with Autism Spectrum Disorders (ASD) as these conditions are characterised by a triad of impairments including deficits in ToM and empathy (Baron-Cohen et al., 1985). These deficits in social impairment are commonly associated with difficulties in applying traditional CBT, requiring adaptations in order to account for this (J. J. Wood et al., 2009). Despite the current lack of research, it would seem reasonable to make the assertion that if a person has deficits in ToM, then the skills required to engage in CBT of being able to identify and reflect on thoughts, and understand that the meaning attributed to events may not reflect reality, is likely to be more difficult.

1.6.3 Development of metacognition and the role in CBT. Metacognition, first conceptualised by Flavell (1979), can be defined as any knowledge or cognitive process that is involved in the appraisal, monitoring or control of cognition. It is generally accepted that metacognition comprises of two separate aspects. Firstly, metacognitive knowledge relates to the information people hold about their own cognitive abilities (e.g. “I have a bad memory”), and the task factors or learning strategies that affect it (Fernandez-Duque, Baird, & Posner, 2000; Wells, 2002). The second aspect, metacognitive regulation, refers to the processes that coordinate cognition and is closely linked to executive function (see section 1.6.4).

Research suggests that the beliefs individuals have about their thoughts and thought processes are linked to their emotional well-being. As emotional disorders are commonly associated with a disturbance in thinking, it is important to consider the influence of metacognitive knowledge. For example, it has been found that while many people believe that worrying can be beneficial, adults with generalized anxiety disorder (GAD) tend to believe that worrying is uncontrollable and dangerous (Cartwright-Hatton & Wells, 1997); and furthermore beliefs pertaining to “worry about worry” have been found to contribute to the development and maintenance of the disorder (Wells, 1995). Cognitive behaviour therapy for the treatment of GAD targets beliefs at the metacognitive level (Wells, 2013). However, few studies have examined the cognitive factors in relation to the development and maintenance of worry in children and adolescents (Laugesen, Dugas, & Bukowski, 2003), and relatively little is known about how children appraise or interpret their worry (Bacow, Pincus, Ehrenreich, & Brody, 2009).

When considering the role of metacognitive abilities in CBT more widely, it is believed that engagement in CBT requires clients to be able to describe,

distinguish between, and reflect on their own thoughts, feelings and behaviours (requiring metacognitive knowledge); whilst metacognitive regulation (monitoring, planning, allocation of attention) will be involved in most CBT tasks (Reynolds et al., 2006).

Research into the development of metacognition suggests young children's ability to think about thinking is limited. If provided with clear cues, children aged 3 to 5 years old are sometimes able to infer if another person is thinking; but on the whole children of this age are poor at determining both when a person is thinking (self and others), and what the content of the thought may be (Flavell, Green, & Flavell, 1995). If children of this age do perceive their thoughts then they tend to be noticed as isolated mental events which are not related to cause and effect.

However, research suggests that there is a significant improvement in metacognitive abilities between 5 and 7 years of age. Flavell, Green, and Flavell (2000) presented two introspection tasks to 5 year olds, 8 year olds, and adults. The first task was structured and participants were asked to think of something they liked to do and something they did not like to do, and then asked to reflect on specific thoughts that had occurred during the exercise. It was found that both 5 and 8 years olds were able to report likes and dislikes, but older children were better able to recall the order in which their thoughts had occurred than younger children. In the second task, participants were asked to have no thoughts at all for a short period. When subsequently asked whether they had experienced thoughts during this period, older children were more likely than younger to report that they had, and reported an awareness of mental strategies they had attempted to employ to suppress thoughts. This suggests that older children have a greater awareness than younger children of their cognition and cognitive processes. However, the difference in performance

between the 8 year olds and the adults suggests that metacognitive abilities continue to develop after this age. These findings are consistent with other studies (Estes, 1994; Flavell et al., 1995).

1.6.4 Development of executive functioning and the role in CBT.

Executive functioning (EF) is an umbrella term that comprises a range of cognitive abilities, including allocation of attention, inhibitory control, hypothesis generation, cognitive flexibility, problem solving and decision making (Fernandez-Duque et al., 2000; Mohlman & Gorman, 2005). Executive functions are particularly important in novel tasks, situations which involve conscious choice between alternatives, or when overriding a strong internal or external pull (Diamond, 2006). Working memory is another key component of EF. The ability to hold things in mind allows us to remember and work towards our plans (goal directed behaviour), and to relate one idea to another (including being able to relate the present to the future and the past). It is essential to our ability to see connections between seemingly unconnected items, and to separate elements from an integrated whole (Diamond, 2006).

All of these skills are likely to significantly enhance an individual's ability to engage in CBT, as it is probable that these abilities are involved in most CBT exercises. For example, thought restructuring exercises require clients to challenge negative thoughts and generate new adaptive thoughts based on the evidence. Clients may also be asked to self-monitor thoughts, behaviours, or provide ratings of mood. Formulations and the development of maintenance cycles require making connections between thoughts, feelings, behaviours and physical sensations, which the client may otherwise have viewed as unrelated. These are all complex tasks, suggesting that intact EF facilitates the successful use of cognitive behavioural techniques (Mohlman & Gorman, 2005).

Mohlman and Gorman (2005) conducted a study to investigate whether older adults with executive dysfunction would show decreased benefit from CBT for GAD compared to those with intact cognitive skills. The study is limited by a small sample size; however it was found that participants whose EF scores remained low from pre to post treatment did not respond to CBT, whereas those whose scores improved showed a reduction in GAD symptoms. This provides some support for the assumption that executive skills are important for the successful use of CBT.

The use of modern neuroimaging techniques has led to widespread agreement that executive functions are most active in the frontal lobes of the brain and more specifically, areas of the prefrontal cortex (PFC; Stuss & Knight, 2013). The neural systems underpinning EF are complex and inter-related with the PFC connected to nearly all other brain regions including the occipital, temporal and parietal lobes, the brain stem and subcortical regions. Therefore, executive dysfunction is not always directly associated with damage to the PFC, but may result from damage or loss to any one of these neural systems (Alexander & Stuss, 2000). A number of models have been proposed to conceptualise the overarching structure of EF. Fundamentally, these models differ in the number of functions they include, the degree to which each function is separable and whether or not EF should be viewed as a unitary construct. One developmental model, based on the views of Alexander and Stuss (2000), proposes that EF has four distinct domains: attentional control, information processing, cognitive flexibility and goal setting (Anderson, 2002). These domains are considered to be discrete, but also operate in an integrative manner to execute certain tasks.

Executive function skills develop progressively through childhood, not becoming fully developed until the early 20's (Levin et al., 1991). Research suggests

this progression is not necessarily linear and may occur in spurts, with different aspects of EF demonstrating different developmental trajectories. This protracted development has been associated with gradual physiological changes in the PFC, in particular synaptogenesis (Huttenlocher, 2013), a reduction in grey matter (Sowell, Thompson & Toga, 2004) and the ongoing myelination of nerve fibres (Tau & Peterson, 2010). These changes gradually increase the speed of neural information in the PFC and are associated with increased performance on executive tasks. Research suggests that there are five periods of rapid growth in the frontal lobes throughout childhood. The first occurs between birth and 5 years of age, associated with significant gains in attentional control processes. Between the ages of 7 and 9 years the other three executive domains in Anderson's model (2002; information processing, cognitive flexibility, and goal setting) all develop significantly, although all four domains do not approach maturity until between 11 and 13 years of age. Although between 5 and 11 years of age dramatic improvements are seen on a range of EF tasks, they are unlikely to reach a level comparative with adults until EF is fully developed at approximately 20 years of age (Rosselli & Ardila, 1993; Welsh, Pennington, & Groisser, 1991).

1.7 How These Skills May be Impacted by pABI

The development of theory of mind, empathy, metacognition and executive functioning in typically developing children were outlined in section 1.6.

Additionally, consideration was given to the role these cognitive skills may play in successful engagement in CBT. This section will briefly outline how sustaining a brain injury during childhood may impact on the development on these skills, and thus may potentially impact on the child's ability to effectively participate in CBT.

1.7.1 The impact of brain injury on theory of mind. Theory of mind is an aspect of social cognition, and therefore a range of social deficits have been associated with ToM impairment. Many of these deficits, such as difficulties with non-literal language, inappropriate social interaction, difficulty applying social knowledge, and apparent lack of concern for others are all commonly seen following a brain injury. This suggests that sustaining a brain injury, in particular a traumatic brain injury, may result in impairments in theory of mind (Bibby & McDonald, 2005). Furthermore, TBI often results in damage to the frontal regions of the brain which have been associated with ToM (Happé, Malhi, & Checkley, 2001; Rowe, Bullock, Polkey, & Morris, 2001).

There have been a number of studies investigating ToM ability in adults following a brain injury, including a robust meta-analysis conducted by Martín-Rodríguez and León-Carrión (2010). Twenty-six studies were included in the review, comparing performance of ABI participants and healthy controls in four widely used ToM tasks: first-order belief task, second order belief task, understanding indirect speech and social faux pas. Overall, the faux pas (effect size = .70) and understanding indirect speech (effect size = .87) tasks revealed a severe impairment in ToM in the ABI group; whilst a moderate impairment was seen in this group on first order (effect size = .52) and second order (effect size = .60) belief tasks.

With regards to the current study, it is more pertinent to consider the impact that childhood brain injury has on the trajectory and development of ToM. However, there is limited research in this area in comparison to the adult ABI literature. As detailed in section 1.6.1, ToM skills develop rapidly during early childhood, and therefore young children may be particularly susceptible to impairment in these skills following ABI. A study by Snodgrass and Knott (2006) assessed children aged

6 to 12 years old with moderate to severe TBI; while a study by Turkstra, Dixon, and Baker (2004) looked at the ToM abilities of adolescents aged 13 to 22 years. Both studies found that children with TBI demonstrated poorer performance compared to a non-injured control group on the more advanced ToM tasks (reading the mind in the eyes, and second-order belief tasks); whereas the groups did not differ on first-order ToM tasks. These findings were generally supported by Walz, Yeates, Taylor, Stancin, & Wade, 2009, although they revealed that children with severe TBI were significantly impaired when compared to children with moderate TBI and OI.

However, contrary to these findings, a further study by Walz, Yeates, Taylor, Stancin, and Wade (2010) examined ToM skills in children aged 6 to 8 years old, who had sustained a brain injury a year prior to assessment. It was found that children with severe TBI were not as able to successfully complete either first or second order ToM tasks at a developmental level comparable to children in the moderate TBI and OI groups. In fact, only 58% of children correctly completed the first order task in the severe TBI group, compared with over a 90% success rate in the other groups. This finding is largely supported by Dennis et al. (2012).

1.7.2 The impact of brain injury on empathy. Social difficulties following severe brain injury, such as being “self-centred” and insensitive to the needs of others, are well documented in the adult literature. This has been attributed, in part, to a reduction in empathy (de Sousa et al., 2011). The evidence to date suggests that a loss of empathy is reported by a significant proportion of adults who have sustained a TBI (S. W. Anderson, Bechara, Damasio, Tranel, & Damasio, 1999; Shamay-Tsoory, Tomer, Goldsher, Berger, & Aharon-Peretz, 2004). For example, R. L. Wood and Williams (2008) investigated the impact of TBI on emotional empathy, the relationship between emotional empathy and neuropsychological ability, and the

influence of low emotional empathy on measures of affect in adults. It was found that 60% of participants in the TBI group demonstrated low emotional empathy scores, compared to 31% in the control group. Furthermore, no relationship was found between emotional empathy scores and injury severity, neuropsychological performance, or low scores on affective measures. These findings suggest many adults with TBI experience a reduction in their ability to empathise, however the deficit does not appear to be related to specific cognitive impairment or mood.

There is currently a paucity of research investigating the development of skills such as emotion recognition and empathy following a brain injury sustained during childhood. However, a key study conducted by Tonks, Williams, Frampton, Yates, and Slater (2007) explored the differences between children with ABI and non-injured controls on their emotion processing skills. It was found that children with brain injuries were significantly less proficient at reading emotional expression as conveyed by faces, voices and eyes than the control group; which would impact on their ability to empathise. This is supported by S. W. Anderson et al (1999) who reported poor empathy, disruptive behaviour, and a lack of moral reasoning in a sample of older children who had sustained a brain injury under the age of 5 years. As mentioned previously, it is important to consider that children who sustain a brain injury during early childhood often “grow into” their deficits, and frequently experience social-emotional behavioural difficulties later in childhood. This is likely to relate to social situations becoming more challenging at this age, requiring more skilful application of these abilities (Tonks et al., 2009).

1.7.3 The impact of brain injury on metacognition. The literature in this area appears to be sparse, with many studies referring to metacognition in the broader context of executive functioning (Ylvisaker & Szekeres, 1989). However, a

few studies have looked more specifically at metacognition as a process of cognitive monitoring and the impact that childhood brain injury has on these abilities. To evaluate the child's conscious awareness of metacognitive monitoring, tasks such as determining whether or not one understands a sentence, the evaluation of whether a particular mnemonic strategy is effective, or the assessment of one's progress on a task are used (Hanten et al., 2004).

The first of these studies was conducted by Dennis, Barnes, Donnelly, Wilkinson, and Humphreys (1996). Children with severe TBI were compared with typically developing children on their metacognition for memory. It was found that children with TBI demonstrated impairments in their metacognitive knowledge by displaying poor estimation of memory span and exaggerated overconfidence in performance. Metacognition in the language domain was also investigated, revealing that children with TBI were impaired on the detection of semantic anomalies. These impairments were particularly seen in children whose injury occurred prior to the age of 7 and involved frontal lobe damage. This study was later replicated and extended by Hanten et al. (2000) and Hanten et al. (2004) in which similar findings were reported.

1.7.4 The impact of brain injury on executive functioning. Executive functioning impairments are commonly reported following brain injury in adults (Spikman, Boelen, Lamberts, Brouwer, & Fasotti, 2010; Stuss, 2011). However, examining these skills in children is complicated by their diverse developmental trajectories as outlined in section 1.6.4, and measures of EF in children have routinely been criticised (V. Anderson, 1998; McAuley, Chen, Goos, Schachar, & Crosbie, 2010; Todd, 1996). It has also been highlighted that as EF develops rapidly

throughout childhood, these skills might be particularly vulnerable to disruption from brain injury (Ewing-Cobbs, Prasad, Landry, Kramer, & DeLeon, 2004).

Although some evidence suggests that early brain insult is related to better long term outcomes due to increased plasticity, this view was countered in a study by V. Anderson et al. (2010) which examined the development of EF skills in children who sustained injuries at different stages through childhood, from gestation through to late childhood. It was found that although children across all ages demonstrated reduced performance on EF tasks compared to non-injured peers, children who sustained an injury before the age of 3 (before the emergence of EF skills) recorded more global and severe EF deficits than children who sustained an injury later in childhood.

As association has also been highlighted between injury severity and EF impairments; suggesting that more significant deficits are seen in children with severe TBI. Furthermore, long term deficits in EF are related to poor psychosocial outcomes (Mangeot, Armstrong, Colvin, Yeates, & Taylor, 2002; Tonks et al., 2011).

1.8 Interim Summary

This section has highlighted a number of cognitive modalities which may enhance an individual's ability to engage in CBT. These include the ability to think about one's thinking (metacognition); to be able to make inferences about the emotions, beliefs and desires of other people and differentiate these from own internal processes (ToM and empathy); and the ability to monitor and control a range of cognitive abilities (executive functioning). It has been highlighted that the development of these skills is often disrupted by sustaining a brain injury during childhood, which may impact on successful participation in CBT. The next section is

going to explore the current evidence base in relation to CBT following brain injury, both in adults and children.

1.9 Evidence for CBT Following ABI

The literature exploring the efficacy of CBT and other interventions for adults who have sustained an ABI is much better developed than for paediatric ABI. In part, this may be due to the ongoing debate about plasticity versus early vulnerability in relation to a childhood brain insult (Ross, Dorris, et al., 2011) . This section will begin by providing a brief overview of CBT for adults with ABI, and then conclude by considering the efficacy of CBT for children with ABI.

1.9.1 CBT for adults with ABI. A range of psychological disorders are common following ABI in adults, and in particular high incidence rates of depression (Kneebone & Dunmore, 2000; Kreutzer, Seel, & Gourley, 2001), anxiety (Hibbard, Uysal, Kepler, Bogdany, & Silver, 1998; Jorge & Robinson, 2003), anger management problems (Walker et al., 2010) and reduced self-esteem (Tyerman & Humphrey, 1984) are reported. Although the evidence base for the use of CBT with this population is growing, it is important to note that to date there have been few randomised controlled trials (RCT). Additionally, a large number of single-case reports have been conducted, and while these provide useful descriptions of interventions, the lack of experimental control limits their contribution to the evidence base.

However, in a comprehensive review of the literature Waldron, Casserly, and O'Sullivan (2012) identified a number of studies investigating CBT for the treatment of anxiety and depression following ABI. Three key studies (including two RCT's) explored the use of individual CBT to treat anxiety (Hodgson, McDonald, Tate, & Gertler, 2005; Hsieh, Ponsford, Wong, Schönberger, McKay, et al., 2012; Hsieh,

Ponsford, Wong, Schönberger, Taffe, et al., 2012). Although limited by small sample sizes, all reported a reduction in general anxiety. However, Hodgson et al. (2005) did not find a reduction in social anxiety which was the focus of their intervention.

A study by Topolovec-Vranic et al. (2010) investigated the effectiveness of a 6-week online CBT programme for patients with TBI and depression. Difficulties with reading, memory, attention and motivation, all commonly impaired following a brain injury, were found to impact on individuals' ability to engage with the intervention. This highlights why adaptations in delivering CBT need to be made for this client group. Nonetheless, a significant reduction in depression was reported. Further studies examining group CBT for individuals with ABI also found a significant reduction in emotional distress, and this was maintained at one and six month follow up (Arundine et al., 2012; Bradbury et al., 2008).

However, the evidence is less compelling for those who have suffered a stroke. Minimal change was found in studies looking at post-stroke depression (Lincoln & Flannaghan, 2003; Lincoln, Flannaghan, Sutcliffe, & Rother, 1997), with only one study reporting clinically significant improvement in three of five participants (Rasquin, Van De Sande, Praamstra, & Van Heugten, 2009). However, these authors expressed concern that poor outcomes may be associated with too few sessions, and longer duration may be needed to produce positive improvements in mood following stroke.

In conclusion the limited research to date provides a mixed picture. Although CBT appears to be somewhat effective for adults who have sustained a TBI, the evidence is much less compelling for those who have sustained other forms of ABI. All of the studies have highlighted that the complex needs of individuals following

brain injury can impact on engagement in CBT, and therefore adaptations are commonly required. Furthermore, it is suggested that group based studies aimed at specific problems, such as anger management or coping skills, and can be effective for this particular difficulty but will not necessarily generalise to have a significant therapeutic effect on anxiety or depression (Anson & Ponsford, 2006; Medd & Tate, 2000). However, CBT that targets anxiety disorders and depression specifically appear to generate better therapeutic outcomes (Arundine et al., 2012; Bradbury et al., 2008; Hsieh, Ponsford, Wong, Schönberger, McKay, et al., 2012; Hsieh, Ponsford, Wong, Schönberger, Taffe, et al., 2012; Rasquin et al., 2009; Topolovec-Vranic et al., 2010).

1.9.2 CBT for children with ABI. Despite several rigorous reviews investigating the effectiveness of psychological therapies with paediatric patients (Kazdin & Weisz, 1998; Kendall, 1998) few studies focus on children and adolescents with acquired brain dysfunctions. However, there is now emerging evidence that CBT may be successfully employed with children who have sustained an ABI. The remit of CBT can be interpreted quite broadly and studies use a variety of methods to deliver their interventions. It appears that the face validity of the interventions employed by the studies outlined below are somewhat less robust than the interventions used in adult studies. Westbrook, Kennerley, and Kirk (2011) report that distinctive features of CBT include collaboration, psychoeducation, active engagement including homework, and a time limited intervention which uses both cognitive and behavioural methods.

Pastore et al. (2011) recruited 40 children aged 4 to 18 with TBI, 28 of who received CBT. However, half of these patients also received a pharmacological intervention in combination with CBT, making it more difficult to attribute any

positive change to the therapy. Nonetheless, it was found that children who received CBT showed a greater decrease in behavioural and psychological problems at the follow up than patients who did not receive it. Although some cognitive components were included with older participants, it appears that the majority of the interventions were behavioural (including different types of reinforcement, shaping and modelling to elicit new adaptive behaviours). Furthermore, while the exact number of sessions is not provided, it is suggested that children received between 32 and 96 individual sessions as well as parents receiving weekly sessions of psychoeducation. It could be argued that while positive outcomes were observed, this intensity of CBT would not be offered in generic mental health services, thus reducing the generalisability of the results.

Prior to this, the aforementioned authors conducted a similar study investigating the use of CBT to treat behavioural and emotional disorders in young brain tumour survivors (Poggi et al., 2009). Once again, 40 participants aged 4 to 18 years old were recruited, with 17 receiving CBT. The length and nature of the intervention provided was the same as that used by Pastore et al. (2011). Similar findings were also reported, with the clinical group demonstrating an overall significant decrease in problematic behaviours in comparison to the control group who did not receive CBT. However, the authors also highlight that some of this positive change may be attributed to an improvement in the patient's quality of life once they returned home from their last episode of hospitalisation. Furthermore, in both of these studies (Pastore et al., 2011; Poggi et al., 2009) it appears that in addition to a significant amount of family support and input, CBT was also delivered within a wider package of rehabilitation. The authors make reference to patients receiving physiotherapy, speech therapy and neuropsychological treatment. With a

range of different treatment components, it is difficult to attribute improvements solely to CBT.

Feeney and Ylvisaker (2003) investigated the effects of a cognitive-behavioural intervention on two young children with challenging behaviour following a TBI. They found the frequency and intensity of the targeted behaviours were dramatically reduced. These positive gains were maintained at the one and eight year follow ups. Similar positive results were reported when this study was replicated (Feeney & Ylvisaker, 2006). The sample size in both of these studies was small, and once again the interventions used primarily behavioural approaches. The focus of the interventions was to reduce challenging behaviour and did not consider psychological aspects following TBI. They describe their intervention as comprising of daily routine, positive momentum, reduction of error, escape communication, adult communication style and graphic organisers. It would appear that the intervention they are evaluating is not 'typical' CBT and greatly limits conclusions that can be drawn for their research. It remains unclear whether children with TBI can utilise the cognitive aspects of CBT.

1.10 Summary, Aims and Rationale for the Study

Childhood brain injury results in a range of impairments across many different areas of functioning. These impairments can result in behavioural difficulties, psychological distress and can impact on the child's social interactions, and day to day functioning. Many of these consequences remain relatively constant or worsen over time as the child "grows into" their deficits (V. Anderson, Morse, Catroppa, Haritou, & Rosenfeld, 2004). Evidence has shown that many children who have suffered a brain injury experience the same level of emotional distress as

children seen in mental health services, yet currently few specialist rehabilitation services for children with ABI are available (Tonks et al., 2010).

Following the reported success of CBT for adults, research began to focus on its efficacy for treating childhood disorders. It is now one of the most widely researched child therapies, and a number of reviews suggest that it is an effective intervention for a wide range of psychological disorders that arise during childhood (Cartwright-Hatton et al., 2004; Grave & Blissett, 2004; Kendall & Panichelli-Mindel, 1995). There are a number of cognitive skills thought to enhance an individual's ability to engage in CBT. These include the ability to think about one's thinking (metacognition); to be able to make inferences about the emotions, beliefs and desires of other people and differentiate these from own internal processes (ToM and empathy); and the ability to monitor and control a range of cognitive abilities, including allocation of attention, inhibitory control, hypothesis generation, problem solving and decision making (executive functioning). The development of these skills is often disrupted by sustaining a brain injury during childhood (S. W. Anderson et al., 1999; Ewing-Cobbs et al., 2004; Hanten et al., 2000; Walz et al., 2010), and are impacted on further by the resulting neurological and cognitive sequelae.

More recently, studies have started to explore the use of CBT for adults who have sustained a brain injury with some positive findings (Waldron et al., 2012). However, to date there is still very little evidence to support whether CBT is a beneficial therapy for children with ABI. Due to the adaptations made it is difficult to draw firm conclusions from the few published papers as a wide range of techniques and interventions are used, many of which only loosely fall under the umbrella term of CBT. This current study aims to explore whether children who

have sustained an ABI have the necessary skills to engage in CBT, by exploring their ability to differentiate between thoughts, feelings and behaviours and link these to a past context. Furthermore, performance on these tasks will be explored in relation to the child's executive functioning, ToM, empathy and metacognitive abilities to see if deficits in these skills correlate to reduced performance.

1.11 Hypotheses

The current study aims to explore the following hypotheses outlined below.

1.11.1 Primary Hypotheses.

1) Children with ABI will demonstrate poorer performance on the thought, feeling, behaviour sort tasks (CBT task 1) relative to typically developing children.

2) Children with ABI will demonstrate poorer performance on the thought to feeling and thought to behaviour linking tasks (CBT task 2) relative to typically developing children.

1.11.2 Secondary Hypotheses.

3) Children in both groups with mental health or behavioural difficulties will demonstrate significantly poorer performance on the CBT skills tasks.

4) Children in both groups with high parent-rated levels of executive dysfunction will demonstrate significantly poorer performance on the CBT skills tasks.

5) Children in both groups with high levels of parent-rated empathy will demonstrate significantly better performance on the CBT skills tasks.

6) Children in both groups who demonstrate ToM ability will perform significantly better on the CBT skills tasks.

7) Children in both groups who demonstrate higher levels of metacognition will perform significantly better on the CBT skills tasks.

Chapter 2

Methodology

2.1 Chapter Overview

This chapter outlines the design, recruitment plan and procedure employed to conduct the research. Details of the participants and measures are also provided, and the chapter concludes by looking at the ethical considerations and a plan for analysis.

2.2 Design

The study employed a between-subjects design with two groups: i) children who have sustained a paediatric acquired brain injury (pABI); and ii) typically developing children (TDC). Participants were seen individually on one occasion, and a range of tasks and questionnaires were completed by both the child and one of their parents or guardians.

The independent variable for the main research questions was the presence or absence of pABI. The dependant variable was the child's score on the measures of CBT skills. Further measures were also used to investigate the relationship between performance on the CBT tasks and a range of cognitive functions thought to relate both to the task demands and engagement in CBT. A range of other measures were employed to characterise the samples and investigate the presence of emotional and behavioural problems across the groups.

2.3 Participants

Children included in the study were aged between 8 and 12 years, 11 months old. This age range was chosen based on previous research demonstrating that by the age of 8 years old children have a good understanding of their own thinking, and have developed the necessary cognitive skills to engage in the tasks designed to assess CBT skills (Quakley et al., 2004). In fact, it is suggested that by the age of 7

years old typically developing children, both with and without visual cues, perform close to ceiling (Quakley et al., 2004). This therefore aims to reduce confounding variables relating to developmental factors when comparing the two groups.

2.3.1 Inclusion criteria. Children in both groups were required to have adequate (English) language ability to an age appropriate standard, in order to understand the test materials and complete the tasks. Further inclusion criteria are outlined below.

2.3.1.1 *pABI* group. a) Participants had to be deemed medically and cognitively stable so that secondary medical factors such as brain swelling had resolved (Noppens & Brambrink, 2004).

b) Participants must have sustained a moderate to severe injury. Where appropriate, severity of injury was measured using one of three ways, all of which are used in standard clinical practice. These were: i) a score on the Glasgow Coma Scale at injury of 13 or below; ii) post traumatic amnesia (PTA) of duration of one day or more; iii) or loss of consciousness for 30 minutes or longer. The specific measure used was dependant on the information available from discussion with the child's parents or clinician; or where possible from the participants medical records.

However, an explicit length of time post-injury for inclusion in the study was not defined because the literature is less clear about a period of spontaneous recovery in children due to ongoing brain maturation. V. Anderson et al. (2004) suggest that residual impairments are not static but that children may 'grow into' deficits gradually throughout childhood, with new impairments emerging as expected developmental milestones are not met.

2.3.2 Exclusion criteria. Exclusion criteria for both groups were the presence of a pre-morbid learning disability, pervasive developmental disorder or

autistic spectrum condition. Parents were asked if their child had ever received a formal diagnosis regarding these conditions during the initial telephone contact. These factors are known to be associated with impairments in cognitive processes, such as theory of mind (Frith, 1994) and executive functioning (Ozonoff, Pennington, & Rogers, 1991). Further exclusion criteria were set for the groups separately and these are outlined below.

2.3.2.1 pABI group. For the pABI group children who had experienced a mild ABI or concussion as defined by : i) a score on the Glasgow Coma Scale of 13 or above; ii) PTA for less than one day or; iii) loss of consciousness for less than 30 minutes were excluded. There have been a number of studies investigating mild TBI which provide conflicting results, and outcomes following mild TBI remain unclear. Furthermore, some studies have used children with mild TBI as ‘controls’ for children with severe TBI (Hawley, 2003).

2.3.2.2 Comparison group. In the typically developing comparison (TDC) group children with speech and language disabilities, a statement of special educational needs and children who were known to be in contact with mental health services were also excluded. Again, parents were asked for this information during the initial telephone contact. A study by Reynolds et al. (2006) reported that children who were rated as being at a higher risk of suffering with mental health problems as rated on the Strengths and Difficulties Questionnaire (SDQ; Goodman, Meltzer, & Bailey, 1998) were significantly poorer at completing the Card Sort Task (CST; Quakley, 2002). On the basis of this, children in contact with mental health services were excluded to reduce confounding variables.

2.4 Sample Size and Power Analysis

The closest previous research on which to base the a priori power analysis¹ on was that of Reynolds et al. (2006), who divided children into ‘at risk’ and ‘low risk’ of mental health difficulties. The means and standard deviations were used as it is probable that the ABI group will fall into the high risk category and the comparison group into the low risk. Based on statistical power at .8 and alpha at .05 it was calculated that 20 participants were required in each group to provide sufficient power for the primary hypotheses.

2.5 Recruitment

Following the submission of a detailed research proposal and ethics application, ethical approval for the research was obtained from Cambridge Central Ethics Committee (see section 2.6). Research procedures outlined below comply with the conditions of the above ethical approval. Approval was also gained from relevant Research and Development sites (see section 2.6).

Participants in both groups were recruited from a number of different services and locations, which are outlined below. The consort diagrams (see figures 1 and 2) provide further details on the recruitment process.

2.5.1 Recruitment to the pABI group. A total of 18 participants were recruited from a range of services across different regions offering treatment or support to children who have sustained an ABI. This included the Cambridge Centre for Paediatric Neuropsychological Rehabilitation (CCPNR, $n = 1$), The Child Development Centre at Addenbrooke’s Hospital ($n = 7$), and The Russell Cairns Unit at the John Radcliffe Hospital ($n = 5$). Additionally, the study was advertised nationally via the Child Brain Injury Trust (CBIT; $n = 2$), Different Strokes ($n = 0$),

¹ Power analyses calculated using GPower version 3.1

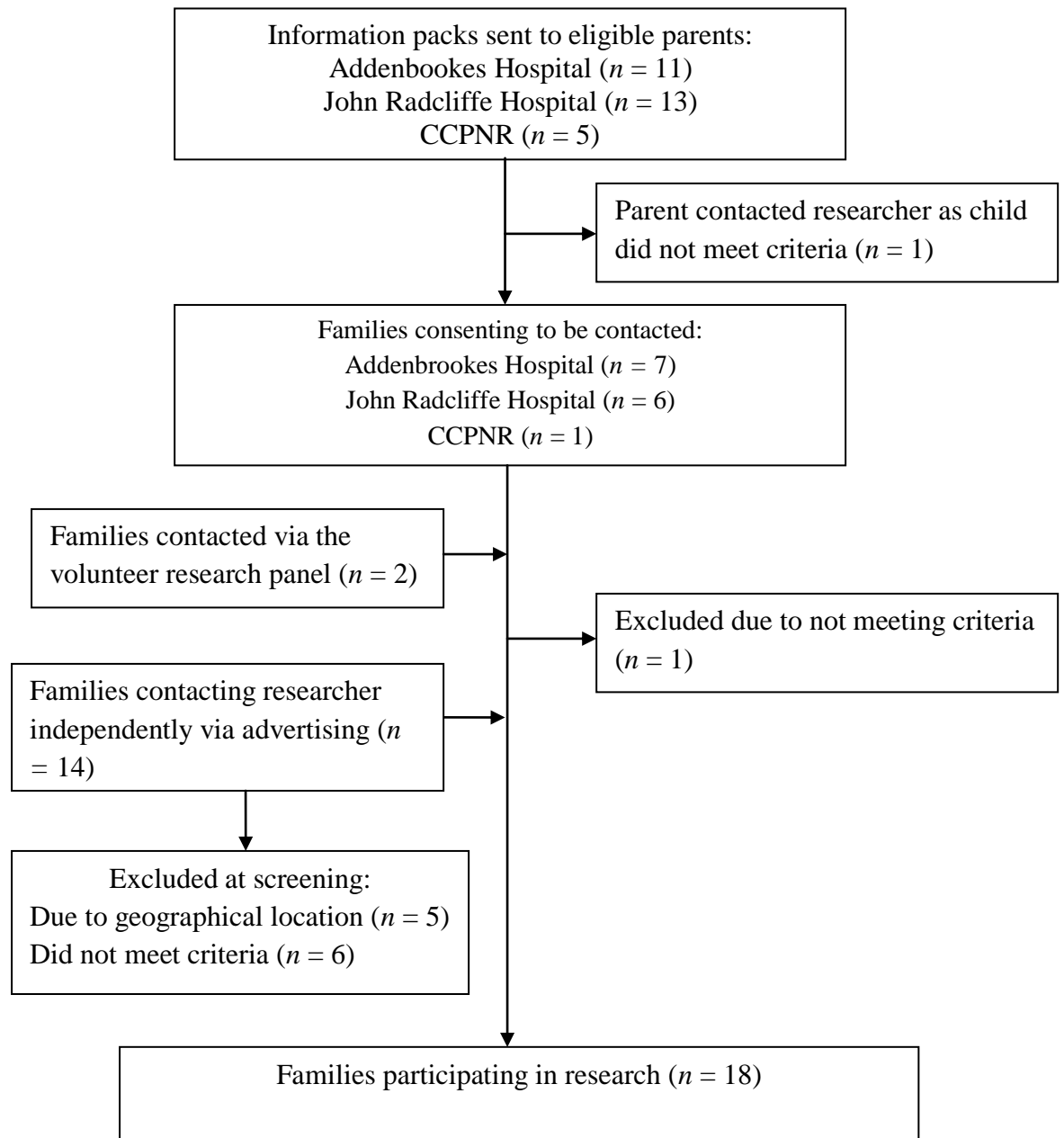
The Encephalitis Society ($n = 1$), and The Arni Institute ($n = 0$). Children were also recruited via the Developmental Neuropsychology Research Group volunteer panel hosted by UEA ($n = 2$). In order to recruit a sufficient sample size recruitment involved visiting children across a wide geographical area including Cambridgeshire, Norfolk, Essex, London, Edinburgh, Kent, Oxfordshire, and Hertfordshire. Figure 1 below provides an illustrative overview of the recruitment process.

After gaining permission from service managers the researcher visited different clinical teams to talk about the research. Team members were asked to identify potentially suitable participants and provide them with an information sheet about the study (Appendix A). In some teams, this included the clinician writing to parents of suitable children selected from their database who had been in contact with the team in the past two years (Appendix B). Those who expressed an interest, either face to face or in response to the letter, were asked to complete a form providing their consent to be contacted by the researcher (Appendix C). If consent was received, telephone contact was made to check that the study selection criteria were met. If deemed to be suitable, a meeting was arranged with the parent and child during which full informed consent was gained from the parent (Appendix C), assent was gained from the child (Appendix C), and the assessments were completed.

Some participants were recruited through other means, including advertisements placed on charity websites. The advert (Appendix D) gave a brief description of the study, and stated the age and nature of the participants required (aged 8 to 12, with an ABI). The researchers contact details (email address and study mobile phone) were provided and potential participants were encouraged to contact the researcher directly for further information. Those who responded were sent an

information sheet, either in the post or via email. Following this, telephone contact was made to assess study eligibility and to arrange a meeting with the child and family.

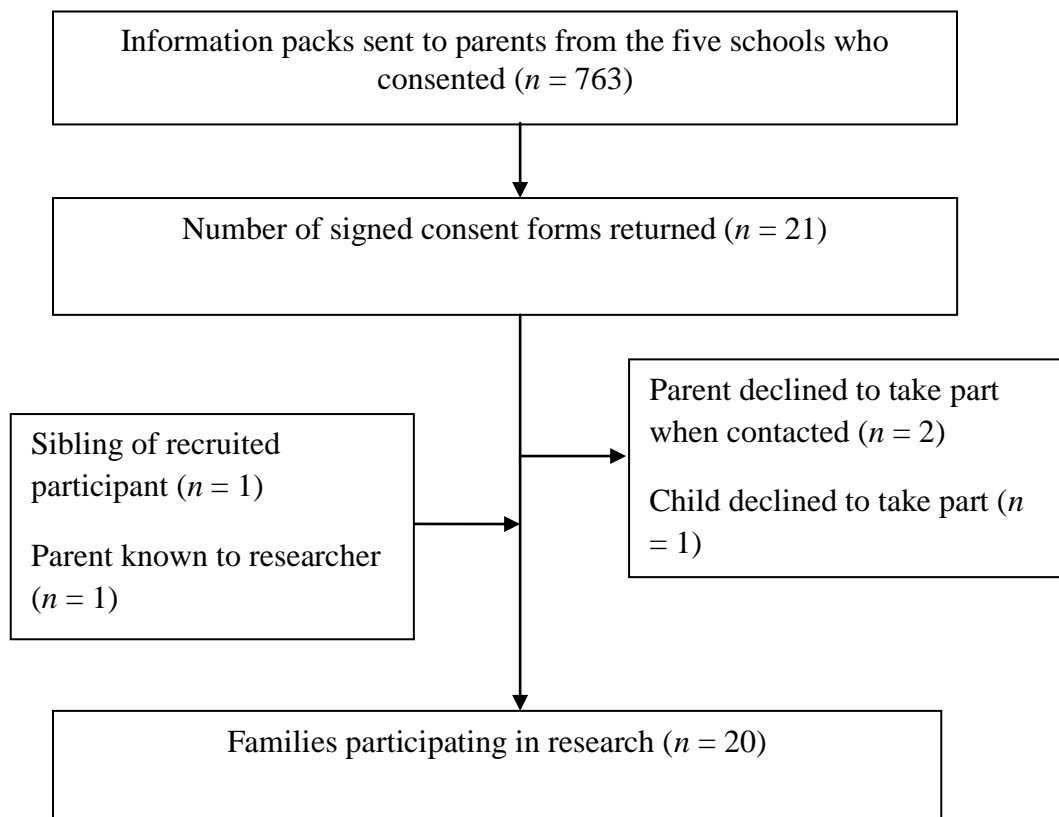
Figure 1: *Recruitment Flow Chart for ABI Group*



2.5.2 Recruitment to the comparison group. Schools were identified via the pre-determined process for trainees at UEA. Head teachers were contacted by letter or email and provided with an information sheet about the study (Appendix E and A). Ten schools were approached in total, of which five head teachers expressed an interest. They were asked to sign a consent form providing permission for the researcher to contact parents (Appendix C). Parents of potential participants were sent an information sheet (Appendix A) and consent form (Appendix C) either in the post or by email and were asked to sign and return the consent form to the school if both they and their child were interested in taking part. If consent forms were returned, the researcher made telephone or email contact to assess whether the inclusion criteria were met and to arrange a time to meet at the child's home.

Additionally, two participants were recruited into this group using snowball sampling. This is a non-probability sampling technique where existing participants can recruit future participants from their acquaintances. This included siblings of recruited children; and children of parents known to the researcher. The same procedure was followed as outlined above with regards to providing information sheets and gaining consent. Figure 2 provides an illustrative overview of the recruitment process.

Figure 2: Recruitment Flow Chart for Comparison Group



2.5.3 Characteristics of sample obtained. As highlighted in Figures 1 and 2, a total of $N = 38$ participants were involved in the study, $n = 20$ comparison children (53%) and $n = 18$ children with ABI (47%). Table 1 below provides demographic information relating to age and gender. There were no significant differences between the groups in these domains. Table 2 provides details regarding the nature and severity of the injuries sustained in the ABI group.

Table 1

Demographic Information (Age and Gender)

Group	Age	Gender	
ABI	$M = 10.22, SD = 1.26$	Male = 7	Female = 11
Comparison	$M = 9.70, SD = 1.26$	Male = 12	Female = 8

Table 2

Injury Information

Participant	Nature of Injury	Severity*	Age at time of injury	Time lapse since injury
1	TBI	GCS = 12/15. Classified as a moderate injury.	6 years, 9 months	28 months
2	TBI	GCS = 8/15. Classified as a severe injury.	9 years	23 months
3	Meningitis and brain abscess	N/A. Hospitalised for 26 days. Required surgery.	10 years, 3 months	11 months
4	TBI	PTA estimated between 1 and 7 days. Classified as a moderate injury.	7 years, 9 months	52 months
5	TBI	GCS = 8/15. Classified as a severe injury.	7 years, 4 months	26 months
6	Stroke	N/A. Hospitalised for 3 months. Shunt inserted.	6 years, 9 months	40 months
7	TBI	GCS = 9/15. Classified as a moderate injury.	8 years, 5 months	14 months
8	TBI	GCS estimated to be 5/15. Classified as a severe injury.	6 months	114 months
9	Acute disseminated encephalitis	N/A. Hospitalised for 3 months.	1 year, 4 months	122 months
10	ABI (resulting from seizures)	N/A. Hospitalised for 14 days. Suffered paralysis down left side.	1 year, 11 months	132 months
11	TBI	Unknown (due to young age)	14 days	111 months
12	Encephalitis	N/A. Hospitalised for one month.	6 years, 1 month	56 months
13	Anoxia and cerebral oedema	Unknown.	At birth	99 months

14	TBI	GCS = 9/15. Classified as a moderate injury.	8 years, 7 months	14 months
15	TBI	GCS = 5/15. Classified as a severe injury.	3 years, 1 month	93 months
16	TBI	GCS = 8/15. Classified as a severe injury.	5 years, 1 month	88 months
17	TBI	GCS = 9/15. PTA = 3 days. Classified as a moderate injury.	7 years, 5 months	39 months
18	TBI	GCS = 7/15. Classified as a severe injury.	10 years, 9 months	21 months

Some data were also collected to identify socio-economic status (SES). As a formal measure was not employed, such as the Four Factor Index of Social Status (Hollingshead, 1975), the commonly used ABC1 classification system was used. This was developed by the National Readership Survey, and estimates social grade based on occupation. In the ABI group, 12 parents (66%) fell into the categories C1 – E (lower middle class – lowest level of income), and the remaining 6 (33%) fell into categories A – B (upper middle class – middle class). In the comparison group, 12 parents (60%) fell into categories A – B, and the remaining 8 (40%) fell into categories C1 – D. This is important to take into consideration as research suggests there is a relationship between SES and a child’s cognitive ability as measures by IQ and school achievement (Hackman & Farah, 2009). In one study it was found that the average range of vocabulary of 3-year-old children from professional families was more than twice as large as for those on government income support (Hart & Risley, 1995).

With regards to nationality and ethnicity, 18 participants (90%) in the comparison group defined themselves as British, with the remaining 2 families (10%) being European (Italian and Portuguese). There was more ethnic diversity

within the ABI group. Twelve families described themselves as white British (67%), one family of Indian nationality (6%), one family of Polish nationality (6%), one British/Filipino family (6%), one British/Moroccan family (6%), and two British/Indian families (11%). English was not the first language of five participants (two in the comparison group and three in the ABI group), although all participants had adequate levels of English language and were able to understand the assessments.

2.6 Measures

A summary of the measures used in the study are outlined below. The first section describes tasks used to assess CBT skills (primary hypotheses). This is followed by measures used to assess cognitive modalities thought to relate to the task demands of the CBT skills tasks (secondary hypotheses). Lastly, measures used to characterise the groups are introduced.

2.6.1 Measures of CBT skills. Two measures were selected to assess children's ability to engage in CBT. The measures are described below alongside a rationale for their selection.

2.6.1.1 Card sort task (CST; Quakley, 2002). This task was designed by Quakley (2002) to assess whether children possess the metacognitive skills to discriminate amongst thoughts, feelings and behaviours. This is thought to be a necessary skill required to engage in CBT (Grave & Blissett, 2004). The task can be administered with or without visual cues. For the purposes of this study the task was presented without visual cues as previous research (Quakley et al., 2004; & Reynolds et al., 2006) suggests that by 8 years old the majority of typically developing children are able to complete this task without the aid of the additional visual cues. Administration time is approximately 10 minutes.

The task comprised of eight stories about a focal character named Harry for male participants and Mary for female participants (Appendix F). The first story is a demonstration story in which the researcher shows the child what is involved in completing the task. The second story is a practice task, in which the child is given feedback on their answer. The remaining six stories are scored. Each story is three sentences long; one sentence includes a thought, one a feeling, and one a behaviour. The story is read out loud in full to the participant, and immediately after each sentence is repeated one by one and the child is asked to indicate whether this was something that Mary/Harry had been doing, something they had been thinking or something they had been feeling. The child's response is given one point for each correctly identified sentence, resulting in a maximum of 18 points.

Half of the stories are mildly negative and half are mildly positive. During the development of the CST the order in which the thoughts, feelings and behaviours appear in the stories was counterbalanced by Quakley (2002). This was to ensure that children could not differentiate the sentences based upon the order in which they were presented in the stories. Additionally, the order in which the six stories were presented in the current study was randomised to control for practice effects. This was achieved by laying the envelopes containing the stories face down on the table and asking the child to randomly select which one they would like to do next, until all six stories had been administered.

With regards to psychometric properties there are few published data. However, the measure has been found to have good construct validity as high correlations exist between this and other measures of meta-cognitive ability (Quakley, 2002). For this study, adequate internal consistency was found for the ABI group ($\alpha = .80$), but the internal consistency was poor for the comparison group ($\alpha =$

.11). However, this is to be expected as children in the comparison group in this study were expected to perform close to ceiling on this task (see section 2.2 for the rationale provided).

2.6.1.2 Thought to feeling story card linking task (TFLT) and thought to behaviour story card linking task (TBLT; Quakley, 2002). This task was adapted from Lagattuta, Wellman, and Flavell (1997). The aim of the task is to test children's ability to link thoughts to feeling and thoughts to behaviours in the context of previous experience. Children were presented with eight illustrated stories, four linking thoughts to feelings (TFLT) and four linking thoughts to behaviours (TBLT). As the cards are laid down in front of the child the researcher reads the corresponding sentence of the story. All stimuli material and procedural/scoring instructions for the TFLT and TBLB are included in Appendix G. It takes approximately 10-15 minutes to administer this assessment.

In the stories the focal character experiences a mildly happy or sad experience. Some days later, when in a different situation, the character comes across a visual cue that is related to the previous happy or sad experience which results in a repeat of the earlier feeling or action. Children were asked to explain why. Depending on the response given children were also asked prompt questions such as 'what made (characters name) feel (emotion) right now?'. The purpose of the cue questions was to elicit the maximum amount of information from the child.

There are no demonstration or sample items included with this task. The rationale is that it is similar to the procedure provided by Lagattuta et al. (1997) and is in concordance with other open ended tasks such as the vocabulary subtest of the Wechsler Intelligence Scale for Children (Wechsler, 1949). The lack of demonstration and sample items reduces testing time, and perhaps more importantly

reduces cueing children into the type of responses that are expected. This allows the researcher to gain a more accurate insight into their skills at linking thoughts to feelings and thoughts to behaviour in the context of previous experience.

The stories in both the TFLT and the TLBT included an equal mix of genders and an equal mix of happy and sad feelings or behaviours. The TFLT stories and the TLBT stories were not presented together. In order to avoid confusion children completed the TFLT then TLBT or vice versa. The order was randomised to reduce practice effects. Additionally, the order in which the four stories that make up the TFLT and TLBT were administered was randomised, by allowing children to pick the envelopes containing the stories in a random order.

In order to score the response, answers were coded in to one of five categories as devised by Quakley (2002). Coding the responses required identifying three aspects of the child's answer. Firstly, the child was required to mention the cue, secondly the thought and thirdly the past event. A more detailed description of the scoring is provided in Appendix G. Each story was scored out of 12; therefore the maximum score on both the TFLT and TLBT that could be achieved was 48. Higher scores on the tasks represent more advanced skills.

Due to the subjective interpretation of the answers provided on these tasks, inter-rater reliability coefficients were calculated. Three TFLT and three TLBT tasks were randomly selected from the overall sample, and rated by a member of staff on the DClinpsy course. As the data are continuous, inter-class correlations were conducted (Shrout, 1998). Coefficients of .99 on the TFLT and .98 on the TLBT were identified. This indicates excellent levels of inter-rater reliability (Field, 2013).

2.6.2 Measures of cognitive function. A number of measures are outlined below which aim to assess the cognitive functions thought to be necessary to

complete the tasks described above, and therefore thought to be needed to engage in CBT. In order to investigate this, metacognition, executive function, basic theory of mind skills and empathy were all assessed. No formal measure of memory was included as the tasks do not make significant demand upon memory as they are supported by immediate repetition in the CST (Quakley et al., 2004), and visual illustrations of the stories in the TFLT and TBLT (Quakley, 2002).

2.6.2.1 Metacognition questionnaire for children (MCQ-C; Bacow, Pincus, Ehrenreich & Brody, 2009). The MCQ-C (Bacow et al., 2009) is a 24 item self report measure of metacognition designed for children aged 7-17 years. It takes approximately 10 minutes, and was completed by the child (with support from the researcher if required). This measure is divided into four subscales, and the most relevant for this study was the ‘cognitive monitoring’ subscale (although the whole measure was scored). Bacow et al. (2009) report that the measure can be reliably used with both clinical and non clinical samples. The measure has adequate psychometric properties with high internal consistency in both clinical and non clinical samples ($\alpha = .87$ and $.89$ respectively for the total scale, and α range $.64-.86$ on the subscales). High levels of concurrent and criterion validity are also reported. In the current study the Cronbach α coefficient for the total scale was $.86$ for the ABI group, and $.66$ for the comparison group.

2.6.2.2 The behavioural rating inventory of executive function (BRIEF; Gioia, Isquith, Guy, & Kenworthy, 2000). The BRIEF is a measure of executive functioning which can be completed by parents or teachers. It is designed for children aged 5-18 years old. For this study, only the parent version was included, taking approximately 10-15 minutes to complete. It measures eight aspects of executive functioning to provide an understanding of a child’s self control and

problem solving skills. It has been designed for use with a range of developmental and neurological conditions, including ABI. The measure consists of 86 items which assess the frequency of behaviours over the last 6-months on a 3-point scale (never, sometimes, and often). The scale is divided into 10 subscales, three of which are related to behavioural regulation, five of which are related to meta-cognition and two validity scales. This measure has good internal consistency with Cronbach α coefficient ranging from .80-.98. The inter-rater agreement was moderate ($r = .32$) but this is said to reflect the different environmental settings (Gioia, Isquith, Guy, & Kenworthy, 2000). Importantly, it has also been shown to have adequate construct and criterion validity in the assessment of children with brain injury (Donders, DenBraber, & Vos, 2010). For the current study this measure was shown to have excellent internal consistency, with a Cronbach α coefficient of .99 for the ABI group, and .96 for the comparison group.

2.6.2.3 Adapted false belief task (Liddle & Nettle, 2006). Participants were asked to complete a brief age appropriate first order theory of mind task. This involved a story with a social situation that required the child to be aware of the perspectives of multiple characters (Appendix H). Following the story the child was asked which statement is true out of four statements. Two of these questions are reported to have theory of mind content, while the other two are factual memory questions. This measure took less than five minutes to administer.

Research suggests that typically developing children have acquired full competence on first-order theory of mind (ToM) tasks by 5 years of age (Wellman et al., 2001). Therefore it was expected that the majority of children would be able to successfully complete this task. However, it has been included as the task demands are similar to that of the TFLT and the TBLT (Quakley 2002). It was hypothesised

that children who do not possess first level ToM skills will have difficulty linking the characters thoughts to their emotions or actions, the rationale for inclusion of this short assessment.

However, false belief tasks have been criticised. It has been suggested that the task requires other abilities besides theory of mind, and that ToM is not purely conceptualised by understanding false beliefs (P. Bloom & German, 2000). Despite these criticisms the false belief task is a widely used, accepted and brief assessment of ToM in children.

2.6.2.4 The children's empathy quotient (EQ-C; Auyeung et al., 2009). The EQ-C (Auyeung et al., 2009) is an adapted parent rated version of the Empathy Quotient questionnaire (Baron-Cohen & Wheelwright, 2004). It takes approximately five minutes, and was completed by the child's parent. The measure consists of 27 items and uses a four point Likert scale ranging from 'Definitely Agree' to 'Definitely Disagree'. The highest score that can be obtained is 54, and higher scores indicate higher parent reported levels of empathy. The measure has been used with both typically developing children and children on the autistic spectrum. Auyeung et al. (2009) reported adequate psychometric properties demonstrating high internal consistency ($\alpha = .93$), as well as good test re-test reliability over a six month period ($r = .86$; Auyeung et al., 2009). For the current study, the measure was found to have good internal consistency with a Cronbach α coefficient of .93 for the ABI group, and .85 for the comparison group.

2.6.3 Measures assessing mental health and behavioural difficulties.

Three measures were incorporated to assess mental health difficulties, specifically anxiety and depression, and behavioural difficulties in both groups.

2.6.3.1 The Spence children's anxiety scale (SCAS; Spence, 1998). The SCAS (Spence, 1998) is a 44 item child self-report questionnaire for children aged 8-15 years. It takes approximately 10 minutes to administer and was completed by the child, with support from the researcher if required. It is designed to assess the young person's perception of the frequency with which they experience symptoms relating to anxiety. The internal consistency of the total scale is high (Cronbach's alpha =.93; Spence, 1998); and for the current study was found to be .92 for the ABI group, and .86 for the comparison group. The internal consistency co-efficient for the subscale scores were also adequate, being .74 for separation anxiety, .74 for social phobia, .76 for obsessive compulsive, .82 for Panic/Agoraphobia, and .77 for Generalized Anxiety. The internal consistency was lower for the Physical Injury Fears (Cronbach's alpha = .60; Spence, 1998). A six month test-retest reliability co-efficient of .60 for the total score on the SCAS has been reported, suggesting reasonably high reliability (Spence, 1998).

2.6.3.2 The mood and feelings questionnaire (MFQ; Angold, Costello, Messer, & Pickles, 1995). The MFQ (Angold et al., 1995) consists of descriptive phrases which question how the participant has been feeling or acting in the past two weeks, and the frequency with which this has occurred (most of the time, sometimes, or not at all). This was completed by the child, with support from the researcher if required, and took on average five minutes to administer. High internal consistency was reported for the scale (Cronbach's alpha 0.90) for both parent and child ratings. For the current study, a Cronbach α coefficient of .81 was found for the ABI group, and .86 for the comparison group. Criterion validity expressed by correlations between parent and child reports are around 0.2-0.4 for all scales.

2.6.3.6 Strengths and difficulties questionnaire (SDQ; Goodman et al., 1998). The SDQ (Goodman et al., 1998) is a brief screening questionnaire commonly used in clinical practice to assess behavioural and mental health difficulties in children aged 3-16 years. This measure has also previously been used with children with ABI (Tonks et al., 2010). It takes approximately five minutes to administer and was completed by the child's parent. The scale is made up of five subscales which assess emotional problems, conduct problems, hyperactivity, peer relationships and prosocial behaviour. Goodman (2001) reported adequate psychometric properties with satisfactory internal consistency ($\alpha = .73$) and test retest reliability after four to six months ($\alpha = .62$; Goodman, 2001). Despite being a widely used measure, poor internal consistency was found for both groups in the current study ($\alpha = .40$ for the ABI group, $\alpha = .60$ for the comparison group). This could be due to the number of different subscales within the measure. Reliability of the subscales was not investigated for the current study.

2.6.4 Other measures. This section outlines measures that were incorporated to help characterise and match children in the two groups. This includes assessments of intelligence, demographic information and where relevant information on injury.

2.6.4.1 Demographic information. Basic demographic information was collected to characterise both participant groups. An idiosyncratic questionnaire was designed for this study (Appendix I) with the selected variables reflecting the type of demographic information gathered in the most recent census by the Office of National Statistics. Participants were asked to provide detail on the number of people living in the household, their relationship to the participant, employment status, profession, and nationality. These variables have also been used in other studies

involving child participants (Hawley et al., 2003; Laloo et al., 2003; Rennie, Court-Brown, Mok, & Beattie, 2007).

2.6.4.2 Information regarding brain injury. Information on injury was collected for the pABI group. Parents were asked to provide information on the type of injury, time since injury and length of hospital admission. Additionally, severity of injury was assessed based on the scores on the GCS at injury (13 or below), length of PTA (30 minutes upwards) or loss of consciousness (upwards of one hour) depending on the information available. If parents did not know this information then the researcher sought their written consent to access the relevant information from their child's medical records. The rationale for collecting this information was that it allowed for verification of the sample and ensured that participants in the pABI group met the required inclusion/exclusion criteria as outlined in section 2.2.1 and 2.2.2. A copy of the form used to collect this data is provided in Appendix J.

2.6.4.3 Short form of the Wechsler intelligence scale for children (WISC-IV; Wechsler, 2003). The WISC-IV is a reliable and valid measure of intelligence for children aged 6 to 16 years. The full 13 subtest version is time consuming and takes over an hour to complete. Various short forms of the assessment have been reliably used for both research and screening with various populations including children that have suffered a brain injury (Donders, 1992). This study used an abbreviated form of the WISC-IV based upon the findings of Crawford et al. (in preparation). This 2-subtest version including Vocabulary and Matrix Reasoning yields an estimated Full Scale IQ with a reliability of .926 and a correlation with the Full WISC-IV of .876. This version only takes 10-15 minutes to administer.

2.7 Ethical Considerations

Ethical issues involving children in research are considered below. Ethical approval to conduct the study was obtained from the Cambridge Central Ethics Committee (REC) prior to commencing the project (REC No: 11/EE/0328; Appendix K), along with authorisation from the appropriate Research and Development organisations (Cambridgeshire & Peterborough NHS Foundation Trust; Cambridge University Hospitals NHS Foundation Trust; Oxford University Hospitals NHS Trust; Appendix L). Permission was also gained from the CBIT Professional Reference Group (Appendix L).

2.7.1 Informed consent. Parents were given an information sheet detailing the purpose of the research, and the length and nature of the assessment (Appendix A). The researcher met with families to answer questions and there was no time limit for participants to decide whether to take part in the study. As participants were below 16 years of age, informed and voluntary written consent was obtained from parents on behalf of their child (Appendix C). The child was read a brief overview of the study, and if happy to proceed they were asked to sign a written assent form (Appendix C). Both parental consent and written assent from the child was required for participation in the study.

For the pABI group, consent was also obtained for permission to access relevant hospital medical records to gain more information about the severity and nature of the brain injury if this information was not known by the family. It was made clear to participants that they could withdraw from the study at any time without giving a reason, and that this would not affect any future contact with services, treatment or educational service they might receive. The child was also

assured that they had the right to withdraw even if their parents had consented for them to participate.

At the end of the study all participants were entered into a prize draw to win one of two vouchers for a high street shop of their choice as a token of gratitude for their participation in the study. If requested, a written summary of the research findings was sent to parents on completion of the study.

2.7.2 Confidentiality. Data were coded anonymously and stored in accordance with the Data Protection Act (1998). Results from assessments were entered and stored on an encrypted and password protected file on the researcher's computer. No personal data were transferred on to the data set or questionnaires and participants were allocated a participant number. Hard copies of the data were stored in a locked box. Personal data was stored completely separately to the raw data generated in the study. In accordance with the requirements of ethical approval, on completion of the study data will be stored in a locked cabinet for ten years.

2.7.3 Managing risk and distress. The CST and Link tasks have been previously used for research in many studies (Quakley et al., 2004 & Reynolds et al., 2006) and participants reported finding the tasks engaging and enjoyable. Steps were taken to ensure that participants did not feel disappointed with their performance on tasks. During neuropsychological testing participants were assured that 'nobody gets every question right' and standardised discontinuation criteria were applied in relation to each test. Where necessary, individuals in the pABI group were given frequent breaks to reduce fatigue and maximise performance. In the case that psychological distress was reported or arose during the study, a plan was in place for the researcher to discuss options with the academic supervisor, which included the option to signpost to relevant organisations (e.g. GP, mental health service).

However, this did not occur with any of the children in the study. In total, five children reported either a high score on the SCAS (scoring over the cut off), or provided answers on the MFQ which raised concern. These families were informed, either at the end of the assessment or shortly afterwards, and were advised to contact their GP if they had any ongoing concerns.

Finally, the researcher conducted home visits during data collection. To minimise risks to the researcher the Cambridgeshire and Peterborough NHS Foundation Trust lone worker policy was followed (CPFT, 2008). The researcher informed others in the research team of the location and time of appointments, and made arrangements to report back on safe return.

2.8 Procedure

Once written consent from a parent had been received, the researcher arranged to meet with the child to carry out the research. All assessments were conducted in the family's home. On average the assessment lasted approximately 60-75 minutes for the child, with parental measures taking approximately 30 minutes to complete.

Prior to beginning the assessment the researcher introduced them self to the child and explained that they were asking the child to help them with a project. The researcher then talked through the rationale, gave the child the opportunity to ask any questions and made sure they understood that they could stop at any point if they wanted to. The researcher asked the child to sign the assent form to indicate that they were happy to take part.

Once the child had given their assent to participate testing began. The order in which the assessment tasks were administered was randomised by the researcher prior to the appointment with the child. Randomisation was completed by assigning

each task a number from one to five and then generating random combinations of these numbers within this range on Microsoft excel. The tasks were administered in the order they were generated.

Children were encouraged to complete all of the assessment tasks and if required a short break was scheduled for, mid way through testing. All of the tasks were conducted and completed in accordance with the instructions. Where relevant the accompanying manuals were used and adhered to. To ensure the child had understood the instructions demonstration and sample items were used for certain tasks, such as the CST (Quakley et al., 2004).

Once the child had finished working through the tasks the researcher thanked them for their participation and completed a short debrief to ensure the content of the tasks had not caused any distress.

2.9 Analysis Plan

Descriptive data will first be presented. Prior to analysis the data will be screened for outliers and missing information and parametric assumptions (homogeneity of variance, normal distribution) will be checked. If necessary, and possible, the data will either be transformed or bootstrapping will be used so that parametric analysis of the data can be employed.

The effect of condition on performance on the CST (Quakley, 2002) will be tested using independent samples t-tests, followed by planned comparisons. Scores from the thought to behaviour and thought to feeling link task will also be analysed in the same way. A number of exploratory correlations will be used to investigate relationships between performance on the two tasks, and the relationship between performance and executive function, mental health and behavioural difficulties, metacognitive skills, ToM and empathy.

Independent samples t-tests will be used to determine if there is a significant difference in general intelligence between the groups. If a significant difference is found on performance between the two groups then analysis of covariance with general intelligence as the covariate will be carried out.

Chapter Three

Results

3.1 Chapter Overview

This chapter begins with an initial examination of the data, describing the procedures used for screening, checking assumptions and methods employed to manage data which are not normally distributed. Following this, descriptive data are presented for all of the measures in both the ABI and comparison group. Next, the research hypotheses are tested using a mix of parametric and non-parametric tests as appropriate (including t-tests, t-tests with bootstrapping, one-way analysis of covariance, Kendall's tau rank correlation coefficient and Pearson product-moment correlation coefficient). The relationship between potential confounding variables and task performance is also considered in relation to the primary measures. Two tailed statistics are employed throughout. In order to control for Type 1 errors, Bonferroni adjustments were applied (Field, 2013). Finally, a summary of the main findings is presented.

3.2 Exploration of data

The data were analysed using Statistical Package for Social Sciences (SPSS; Chicago, IL) version 21.0 for Windows.

3.2.1 Data screening. Data were initially checked for accuracy. Due to careful screening of all questionnaires at the time of the assessments, there were no missing values. Boxplots were used to screen for outliers. In addition, data were converted to z-scores to further examine outliers. Eight probable outliers were identified ($z > 2.58$), but only one outlier was considered to be extreme ($z > 3.29$).

These were checked against paper copies and found to be valid entries (not due to input or calculation errors), and therefore remains in the analyses.

3.2.2 Examining the distribution of the variables. The distribution of the data was initially assessed visually using histograms and normal quantile-quantile (Q-Q) plots. Copies of the histograms for each of the measures are included in Appendix M and N. Additionally, the data were assessed statistically by using the Shapiro-Wilk (S-W) test and by examining skew and kurtosis values. Visual inspection indicated that not all of the data appeared to be normally distributed. Therefore the significance of skew and kurtosis was further investigated by employing the formulae displayed below (Field, 2013, p. 184).

Skew	Kurtosis
Standard error (SE) of skew	Standard error (SE) of kurtosis

Taking into account the overall size of the sample ($N = 38$), a significance level of $p = .05$ and the associated z -score of 1.96 were considered as an appropriate parameter to assess the significance of skew and kurtosis (Field, 2013). Therefore, the obtained z -scores were deemed significant if greater than or equal to 1.96, or less than or equal to -1.96.

With regards to the Shapiro-Wilk test, if it was found to be not significant ($p > .05$) it suggested that the distribution of the sample was not significantly different from a normal distribution. Shapiro-Wilk was utilised rather than Kolmogorov-Smirnov as it is more appropriate for small sample sizes (< 50 samples; Field, 2013).

Based on both skew and kurtosis values and S-W, the Spence Children's

Anxiety Scale (SCAS) and Card Sort Task (CST) were considered to be not normally distributed in the ABI group. Although skew and kurtosis were not significant for the Metacognition Questionnaire for Children (MCQ-C), both visual inspection of the histogram and S-W indicated a significant deviation from normality. All other measures in this group were found to be normally distributed.

For the comparison group, both skew and kurtosis values and S-W suggested that the Mood and Feelings Questionnaire (MFQ), CST, and the Strengths and Difficulties Questionnaire (SDQ) were not normally distributed. Although the overall MCQ-C was deemed to be normally distributed, the monitoring subscale of this measure appeared not to be normally distributed based on S-W and visual inspection of the histogram. All other measures for this group were normally distributed. For this group, these findings are consistent with what might be expected as it is hoped that typically developing children do not have significant mood or behavioural difficulties. The CST was also expected to be skewed due to most children in the comparison group being expected to perform close to ceiling.

Transformations, such as logarithm or square root, were considered as possible options to improve the distributions of the non-normally distributed data. However, this did not seem to be the most appropriate approach, particularly with regards to the CST. In the comparison group, all children scored between 15 and 18 (with the maximum score being 18), and the median was found to be 18 (suggesting more than 50% of all scores were at ceiling). Therefore, adding a constant to each score or multiplying each score by a constant would be highly unlikely to result in a normal distribution. Instead, bootstrapping the CST was considered to be a more suitable approach for analysis of the primary research questions. Bootstrapping does not require normality or equal variances, and allowed both primary research

questions to be analysed using parametric t-tests. To address the secondary research questions, a mix of parametric and non-parametric tests were used as appropriate. Primarily, Kendall's tau was utilised rather than Spearman's coefficient due to the data set being small and containing a number of tied ranks (particularly in the CST). Kendall's tau is considered to provide a better estimate of the correlation in the population, allowing for more accurate generalisations to be drawn than from Spearman's (Field, 2013).

Previous research has analysed the thought to feeling and thought to behaviour link tasks separately. However, given the similarities between the tasks and the number of comparisons being made, a pragmatic decision was made to amalgamate the scores of these tasks. This will be referred to throughout this chapter as the TFTB link tasks. Additional checks were made by assessing both of the tasks separately in relation to the other variables to assess the validity of combining the tasks. The results were found to remain the same when assessed together or separately. A table of results for the tasks analysed separately is included in Appendix O.

3.3 Descriptive Statistics

An overview of the characteristics of both groups is presented in section 2.5.3, with information on age, gender, socioeconomic status (SES), nationality/ethnicity, type of brain injury, and length of time since injury. This section will briefly outline the descriptive statistics on the main assessment measures, including the range, mean score and standard deviation..

Table 3

Descriptive Statistics for all Measures in the ABI Group

Measure	N	Min	Max	Mean	SD
CST	18	7	18	15.78	3.23
TFLT	18	6	44	28.56	10.48
TBLT	18	1	44	20.11	13.82
TFTB Combined	18	7	80	48.67	18.78
ToM	18	0	1	.833	.383
IQ	18	54	123	94.00	19.56
SCAS	18	2	71	23.56	16.89
MFQ	18	0	25	10.39	6.55
MCQ-C	18	29	61	40.89	10.75
Monitoring Scale	18	6	21	12.00	4.52
EQ-C	18	7	52	28.56	12.90
SDQ	18	1	30	15.61	9.35
BRIEF - GEC	18	37	86	64.78	16.18

Note. CST = Card Sort Task; TFLT = Thought to Feeling Link Task; TBLT =

Thought to Behaviour Link Task; TFTB combined = Thought to feeling and thought to behaviour linking tasks combined score; ToM = Theory of Mind; IQ = Intelligence Quotient; SCAS = Spence Children's Anxiety Scale; MFQ = Mood and Feelings Questionnaire; MCQ-C = Metacognition Questionnaire for children; Monitoring scale = subscale of MCQ-C; EQ-C = The Children's Empathy Quotient; SDQ = Strengths and Difficulties Questionnaire; BRIEF – GEC = The Behavioural Rating Inventory of Executive Functioning – Global Executive Composite.

Table 4

Descriptive Statistics for all Measures in the Comparison Group

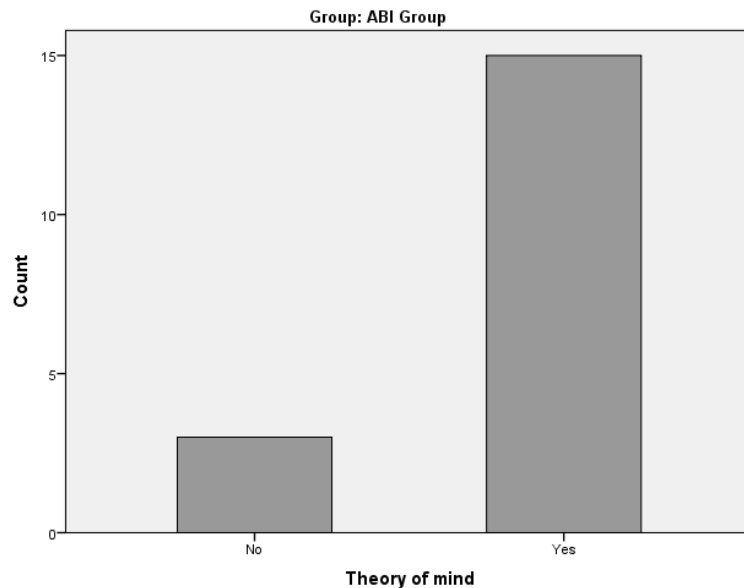
Measure	N	Min	Max	Mean	SD
CST	20	15	18	17.30	1.08
TFLT	20	24	48	38.25	5.89
TBLT	20	7	46	30.25	9.67
TFTB Combined	20	49	92	68.50	11.33
ToM	20	1	1	1	0
IQ	20	97	143	116.85	11.76
SCAS	20	4	53	23.95	13.74
MFQ	20	3	28	10.45	7.05
MCQ	20	34	60	43.35	6.83
Monitoring Scale	20	9	19	13.00	3.18
EQ-C	20	21	51	40.55	8.44
SDQ	20	0	34	6.95	7.63
BRIEF - GEC	20	34	70	47.90	8.01

Note. CST = Card Sort Task; TFLT = Thought to Feeling Link Task; TBLT = Thought to Behaviour Link Task; TFTB combined = Thought to feeling and thought to behaviour linking tasks combined score; ToM = Theory of Mind; IQ = Intelligence Quotient; SCAS = Spence Children's Anxiety Scale; MFQ = Mood and Feelings Questionnaire; MCQ-C = Metacognition Questionnaire for children; Monitoring scale = subscale of MCQ-C; EQ-C = The Children's Empathy Quotient; SDQ = Strengths and Difficulties Questionnaire; BRIEF – GEC = The Behavioural Rating Inventory of Executive Functioning – Global Executive Composite.

Unlike the other measures employed, the assessment of ToM ability produces categorical rather than continuous data. As a result the mean score is of limited use. All children in the comparison group scored correctly on this task, and Figure 3 below illustrates how many children demonstrated ToM ability in the ABI group.

Figure 3

Theory of Mind Ability in the ABI Group



3.3.1 Baseline differences between the groups. A series of t-tests were performed to assess whether there were any significant differences between the groups in terms of age, SES and IQ. It was found that there was no significant difference in age between the ABI group ($M = 10.22$, $SD = 1.26$) and the comparison group ($M = 9.70$, $SD = 1.26$; $t(36) = -1.27$, $p = .21$). However there was a significant difference in terms of SES between the ABI group ($M = 3.17$, $SD = 1.54$) and the comparison group ($M = 2.05$, $SD = .69$; $t(22.94) = -2.83$, $p = .01$); and a significant difference in terms of IQ between the ABI ($M = 94.00$, $SD = 19.56$) and comparison group ($M = 116.85$, $SD = 11.76$; $t(36) = 4.42$, $p = <.001$). Given the significant findings of SES and IQ, these variables will be considered as potential covariates in relation to the primary hypotheses.

3.4 Hypothesis Testing

3.4.1 Differences on the CST between the comparison and ABI group

(Hypothesis 1). Hypothesis 1 predicts that children with ABI will demonstrate poorer performance on the CST relative to typically developing children. An independent samples t-test, with bootstrapping was conducted to compare performance between the two groups. On average, participants in the comparison group ($M = 17.30$, $SD = 1.08$) performed better on the CST than children in the ABI group ($M = 15.78$, $SD = 3.23$). This difference, 1.52, BCa 95% CI [.228 - 2.901] is significant. As the robust confidence interval does not cross zero, it can be assumed that the value is less than .05. According to Cohen (1988) this represents a medium effect size (eta squared = .09).

3.4.1.1 Controlling for potential confounders. Despite the CST not being normally distributed, an analysis of covariance (ANCOVA) was conducted with the CST as the dependant variable, the grouping (ABI or comparison group) as the independent variable, and age, gender, IQ and SES as covariates. Bootstrapping was applied to give robust confidence intervals around the estimated marginal means and parameter estimates; however this does not alter the main F -test. When controlling for SES, age and gender Levene's test of equality of error variances was significant, suggesting that the data does not meet the assumptions of the ANCOVA. Therefore the findings should be interpreted with caution. Nonetheless, there is no comparable non-parametric test to control for covariates.

The analysis revealed that the difference between the groups was no longer significant after controlling for IQ ($F(1,35) = .47$, $p = .50$), SES ($F(1,35) = 3.01$, $p = .09$), age ($F(1,35) = 3.76$, $p = .06$) or gender ($F(1,35) = 3.38$, $p = .07$). However,

when a parametric t-test was used to compare performance on the CST without bootstrapping, the difference was also not significant between the groups ($t(20.42) = 1.91, p = .07$). Without an appropriate non-parametric test, it is difficult to estimate the true influence of the potential confounding variables. However, the values between the non-bootstrapped t-test, and after controlling for age, gender and SES are similar, suggesting that these are not confounding variables. However, after controlling for IQ the values are significantly different, and therefore it could be assumed that IQ is accounting for a large amount of the variance between the groups. Although this suggests that IQ is a potential confounding variable this needs to be interpreted with extreme caution as IQ is frequently impacted upon by ABI (as highlighted in section 1.2.4.3). This will be discussed further in the next chapter.

Table 5

The Influence of Potential Covariates on the CST

Measure	Covariate			
	IQ	SES	Age	Gender
CST	Group = $p = .06$	Group = $p = .001$	Group = $p = .001$	Group = $p = .000$
	IQ = $p = .01$	SES = $p = .08$	Age = .92	Gender = .90

Note. CST = Card Sort Task; IQ = Intelligence Quotient; SES = socioeconomic status.

3.4.2 Differences on the TFTB link tasks between the comparison and

ABI group (Hypothesis 2). Hypothesis 2 predicts that children with ABI will

demonstrate poorer performance on the TFTB link tasks relative to typically

developing children. An independent samples t-test was conducted to compare

performance between the two groups. A significant difference was found between

the ABI group ($M = 48.67, SD = 18.78$) and the comparison group ($M = 68.50, SD =$

11.33; $t(36) = 3.99, p = < .001$). According the Cohen (1988) this represents a large effect size (eta squared = .31). This finding supports the hypothesis that children with ABI did not perform as well on this task as typically developing children.

3.4.2.1 Controlling for potential confounders. A one way between-subjects ANCOVA was conducted with the TFTB Link task as the dependant variable, the grouping (ABI or comparison group) as the independent variable, and age, gender, IQ and SES as covariates. The difference between the two groups on performance of the TFTB link task remained significant after controlling for age ($F(1,35) = 14.62, p = .001$), gender ($F(1,35) = 14.97, p = < .001$) and SES ($F(1,35) = 12.54, p = .001$). Although approaching significance, the analysis revealed that after controlling for IQ the difference between the groups on performance on the TFTB link tasks was no longer significant ($F(1,35) = 3.71, p = .06$). As mentioned above, IQ as a potential confounding variable needs to be interpreted with caution and will be discussed further in the next chapter.

Table 6

The Influence of Potential Covariates on the TFTB Link Task

Measure	Covariate			
	IQ	SES	Age	Gender
TFTB Link Task	Group = $p = .062$	Group = $p = .001$	Group = $p = .001$	Group = $p = .000$
	IQ = $p = .01$	SES = $p = .08$	Age = .92	Gender = .90

Note. TFTB Link Task = Thought to Feeling and Thought to Behaviour Link tasks; IQ = Intelligence Quotient; SES = socioeconomic status.

3.4.3 Relationship between performance on CBT tasks and mental health and behavioural difficulties (Hypothesis 3). Hypothesis 3 predicted that children with mental health or behavioural difficulties would demonstrate significantly poorer

performance on the CBT skills tasks in both of the groups. A combination of Kendall's tau and Pearson product-moment correlation coefficient were used depending on the distribution of the different variables.

In the comparison group, no significant correlations were found between the CBT tasks and the SCAS, MFQ or SDQ (see table 5 below). For the ABI group, the only significant correlation found was between the SDQ and the CST ($\tau = -.404$, $p = .03$, $n = 18$). However this did not remain significant following Bonferroni adjustment (.05 divided by the number of comparisons, setting a new alpha of $p = .01$). These findings do not support the hypothesis that higher levels of mental health or behavioural difficulties have a negative impact on CBT task performance.

Table 7

Kendall Tau (τ) and Pearson Product-Moment Correlation (r) Coefficients between CBT Tasks and the SCAS, MFQ and SDQ for the Comparison and ABI Groups.

	ABI Group ($n = 18$)		Comparison Group ($n = 20$)	
Measure	CST	TFTB Link	CST	TFTB Link
SCAS	$\tau = -.148$ $p = .42$	$\tau = .020$ $p = .91$	$\tau = -.148$ $p = .42$	$r = .107$ $p = .65$
MFQ	$\tau = -.112$ $p = .54$	$r = -.202$ $p = .42$	$\tau = .130$ $p = .49$	$\tau = .127$ $p = .45$
SDQ	$\tau = -.404$ $p = .03$	$r = -.358$ $p = .14$	$\tau = -.265$ $p = .16$	$\tau = -.271$ $p = .11$

Note: SCAS = Spence Children's Anxiety Scale; MFQ = Mood and Feelings Questionnaire; SDQ = Strengths and Difficulties Questionnaire; CST = Card Sort Task; TFTB Link = Thought to Feeling and Thought to Behaviour Linking Task.

3.4.4 Relationship between performance on CBT tasks and executive

functioning (Hypothesis 4). Hypothesis 4 predicted that children with high parent-rated levels of executive dysfunction would demonstrate significantly poorer performance on the CBT skills tasks in both groups. A Kendall's tau correlation was conducted to explore the relationship between the CST and EF, and Pearson product moment correlation coefficient was used to investigate the relationship between EF and the TFTB link tasks (see table 6 below).

For the ABI group, a negative relationship was found between the CST and EF, however this was non-significant ($\tau = -.334, p = .07, n = 18$). This was also the case for the TFTB link tasks ($r = -.427, p = .08, n = 18$). With regards to the comparison group, no significant relationship was found between EF and the CST ($\tau = -.079, p = .67, n = 20$). However, a strong negative correlation was found between EF and the TFTB link tasks ($r = -.613, p = .004, n = 20$). This indicates that better executive functioning (as demonstrated by a lower score on the BRIEF) relates to better performance on the TFTB link tasks. According to Cohen (1988) this represents a large effect size. This remained significant following Bonferroni adjustments (setting a new alpha of $p = .025$). Whilst all correlations represented a negative relationship, only one reached significance. This therefore provides partial support for hypothesis four.

Table 8

Kendall Tau (τ) and Pearson Product-Moment Correlation (r) Coefficients between CBT Tasks and EF for the Comparison and ABI Groups.

Measure	ABI Group ($n = 18$)		Comparison Group ($n = 20$)	
	CST	TFTB Link	CST	TFTB Link
BRIEF	$\tau = -.334$ $p = .07$	$r = -.427$ $p = .08$	$\tau = -.079$ $p = .67$	$r = -.613$ $p = .004$

Note: Only correlations that were significant after Bonferroni adjustments ($0.05/2$) are reported in boldface. BRIEF = Behavioural Rating Inventory of Executive Functioning; CST = Card Sort Task; TFTB Link = Thought to Feeling and Thought to Behaviour Linking Task.

3.4.5 Relationship between performance on CBT tasks and empathy

(Hypothesis 5). Hypothesis 5 predicted that children with high levels of parent-rated empathy would demonstrate significantly better performance on the CBT skills tasks in both groups. A Kendall's tau correlation was conducted to explore the relationship between the CST and empathy. In the comparison group, no significant correlation was found ($\tau = .206$, $p = .26$, $n = 20$), but a significant positive correlation was found in the ABI group ($\tau = .417$, $p = .03$, $n = 18$). According to Cohen (1988), this is considered to represent a medium effect size.

The relationship between empathy and the TFTB link tasks was investigated using Pearson product-moment correlation coefficient. A significant positive correlation was found for both the comparison group ($r = .51$, $p = .02$, $n = 20$), and the ABI group ($r = .469$, $p = .05$, $n = 18$). According to Cohen (1988) these represent large and medium effect sizes respectively.

Following Bonferroni adjustments (setting a new alpha of .025), the

correlation between the CST and empathy in the ABI group remained significant, as did the correlation between the TFTB link tasks and empathy for the comparison group. This finding provides partial support of the hypothesis that empathy is related to CBT task performance, suggesting that higher levels of empathy positively impact on a child's performance on the CBT tasks.

Table 9

Kendall Tau (τ) and Pearson Product-Moment Correlation (r) Coefficients between CBT Tasks and EQ-C for the Comparison and ABI Groups.

Measure	ABI Group ($n = 18$)		Comparison Group ($n = 20$)	
	CST	TFTB Link	CST	TFTB Link
EQ-C	$\tau = .417$ $p = .025$	$r = .469$ $p = .05$	$\tau = .206$ $p = .26$	$r = .509$ $p = .02$

Note: Only correlations that were significant after Bonferroni adjustments (0.05/2) are reported in boldface. EQ-C = The Children's Empathy Quotient; CST = Card Sort Task; TFTB Link = Thought to Feeling and Thought to Behaviour Linking Task

3.4.6 Relationship between performance on CBT tasks and theory of mind (Hypothesis 6). Hypothesis 6 predicted that children who demonstrate ToM ability will perform significantly better on the CBT skills tasks in both groups. It was not possible to perform analysis for the comparison group, as all 20 children scored correctly on the ToM test. For the ABI group, a Kendall's tau correlation was conducted. A significant negative correlation was found between performance on the CST and ToM ($\tau = -.544, p = .01, n = 18$). According to Cohen (1988), this is considered to represent a large effect size. This correlation remained following Bonferroni adjustments. However, no significant relationship was found between the TFTB link tasks and ToM ($\tau = -.329, p = .11, n = 18$). This finding provides partial

support of the hypothesis that ToM ability is related to CBT task performance. This finding may suggest that a lack of ToM negatively impacts on a child's ability to differentiate thoughts, feelings and behaviours.

3.4.7 Relationship between performance on CBT tasks and metacognition (Hypothesis 7). Hypothesis 7 predicted that children who demonstrate higher levels of metacognition will perform significantly better on the CBT skills tasks. A combination of Kendall's tau and Pearson product-moment correlation coefficients were conducted. In the comparison group, no significant correlations were found between the CBT tasks and either the total MCQ-C or the monitoring subscale (see Table 8 below).

Similarly, no significant relationships were found on these variables for the ABI group using either Kendall's tau or Pearson product-moment correlation coefficient (see Table 8 below). These results therefore do not support the hypothesis that performance on CBT tasks would have a significant positive relationship with metacognitive ability.

Table 10

Kendall Tau (τ) and Pearson Product-Moment Correlation (r) Coefficients between CBT Tasks, MCQ-C and Monitoring Subscale for the Comparison and ABI Groups.

Measure	ABI Group		Comparison Group	
	CST	TFTB Link	CST	TFTB Link
MCQ-C	$\tau = -.164$ $p = .38$	$\tau = -.033$ $p = .85$	$\tau = -.022$ $p = .91$	$r = .287$ $p = .22$
Monitoring Scale	$\tau = .068$ $p = .72$	$r = .214$ $p = .39$	$\tau = -.118$ $p = .53$	$\tau = .096$ $p = .57$

Note: MCQ-C = Metacognition Questionnaire for Children; CST = Card Sort Task; TFTB Link = Thought to Feeling and Thought to Behaviour Linking Tasks.

3.5 Supplementary Analyses

To assist in understand the findings further, some additional analyses were completed.

3.5.1 Differences on the secondary measures. Differences between the ABI and comparison groups on each of the secondary measures were explored. A combination of independent samples t-tests and Mann-Whitney U were conducted. The results revealed that there were no significant differences on the Spence Children's Anxiety Scale ($U = 162.00, p = .61$), the Mood and Feelings Questionnaire ($U = 188.00, p = .83$), or the Metacognition Questionnaire for Children ($U = 137.50, p = .22$). These three measures are the based on child self-report. However, significant differences between the groups were found on parent rated measures, including the Strengths and Difficulties Questionnaire ($U = 279.50, p = .003$), the Behavioural Rating Inventory of Executive Function ($U = 282.00, p = .002$) and the Children's Empathy Quotient ($t(36) = 3.43, p = .002$). These findings indicate a large effect size.

3.5.2 Time since injury. Given the variability in the ABI group, the relationship between time since injury and performance on the CBT tasks was also explored. Time since injury was found to be normally distributed, however due to the distribution of the CBT task data a mix of Kendall's tau and Pearson product-moment correlation coefficient's were used. It was revealed that, whilst approaching significance, time since injury did not significantly impact on performance on the CST ($\tau = -.354, p = .06$), or on the TFTB link tasks ($r = -.454, p = .06$).

3.6 Summary of Findings

The results provided some evidence consistent with the hypotheses. With regards to the primary hypotheses, a significant difference was found between the

ABI and comparison groups on performance of both CBT tasks. This supports the hypothesis that children with ABI will demonstrate poorer performance on these tasks compared with typically developing children. When controlling for potential confounding variables, it appeared that the difference between the groups was no longer significant when IQ was controlled for. However, this needs to be interpreted cautiously for a number of reasons, and will be discussed in detail in the next chapter.

Mixed results were found in relation to the secondary hypotheses. In contrast to what was predicted, no significant relationship was found in either of the groups between metacognition and performance on the CBT tasks, or between mental health or behavioural difficulties and performance on the CBT tasks. The hypotheses relating to empathy, executive functioning and theory of mind were partially supported. A significant positive relationship was found between empathy and performance on the CST in the ABI group, and in the comparison group a significant positive relationship was found between empathy and performance on the TFTB link tasks. A significant negative relationship was found between executive functioning and the TFTB link tasks in the comparison group, indicating that better executive functioning ability is related to better performance on the TFTB link tasks. However, no significant relationship was found in the ABI group which contradicts what was expected. Finally, a significant negative correlation was found in the ABI group between theory of mind ability and performance on the CST, suggesting that a lack of theory of mind negatively impacts performance on the CST. It was not possible to assess this relationship in the comparison group due to all participants scoring accurately on the theory of mind task.

Additional analyses revealed that the length of time since injury does not significantly impact performance on the CBT tasks. Furthermore, it was highlighted that there were no significant differences between the groups on the child self-report measures (SCAS, MFQ and MCQ-C); although significant differences between the groups were found on the parent rated measures (SDQ, BRIEF, and EQ-C).

It was difficult to assess the potential impact of confounding variables for the secondary analyses due to the CST being non-normally distributed, and the lack of an appropriate non-parametric test. Although an ANCOVA was attempted in relation to the primary measure, it was felt that this did not necessary provide an accurate representation and was therefore felt not to be appropriate for the secondary analyses. The next chapter will discuss these findings further.

Chapter Four

Discussion

4.1 Chapter Overview

This chapter begins by summarising the findings in relation to each of the initial hypotheses, and linking this with previous research. The strengths and limitations of this study are then described, and consideration is given to how these may have impacted on the findings. Finally, the theoretical and clinical implications of the findings are discussed, along with suggestions for future research.

4.2 Interpretation of Findings

In section 1.11, a number of hypotheses were outlined. The primary hypotheses suggested that children with ABI would demonstrate poorer performance on the CBT skills tasks compared with typically developing children. The secondary hypotheses relate to the different factors which might impact upon performance, including metacognition, empathy, theory of mind, executive functioning, and mental health or behavioural difficulties. Relationships between these variables were subsequently analysed, and the findings of each hypothesis will be discussed in relation to previous research.

4.2.1 Hypotheses 1 and 2: Children with ABI will demonstrate poorer performance on the thought, feeling, behaviour sort task, and on the thought to feeling and thought to behaviour linking tasks, relative to typically developing children. Previous research has indicated that by the age of 7, typically developing children demonstrate good performance on tasks of CBT skill (Quakley et al., 2004). It is believed that effective performance on these tasks is likely to predict successful engagement in CBT. However, given the range of impairments experienced after

brain injury, it was hypothesised that children with ABI would demonstrate significantly poorer performance on the CBT skills tasks relative to typically developing children. This hypothesis was supported.

Following a childhood brain injury, social, behavioural and psychological difficulties are commonly experienced. In fact, research suggests that children who have suffered a brain injury experience the same level of emotional distress as children seen in mental health services (Tonks et al., 2010). Following a growing body of evidence suggesting that CBT can be beneficial for adults who have sustained a brain injury, attention has turned to whether CBT is also beneficial for children who have sustained a brain injury. However to date there is a paucity of research in this area in comparison to the adult literature.

The studies that have been conducted so far have reported that CBT can have a positive impact on children following brain injury. However, there are a number of limitations to these studies (outlined in detail in section 1.9.2) which influence the findings. In particular, CBT is used as a broad umbrella term, encompassing a range of interventions which tend to focus much more on behavioural rather than cognitive techniques. A substantial number of sessions were provided (up to 96), and often delivered intensely (2-3 sessions a week with additional family support). There are currently few specialist services that provide rehabilitation for children with ABI, and this level of input is unlikely to be provided in a general mental health setting.

Based on these findings, it was thought that further exploration of children's ability to engage in CBT following brain injury would be helpful, by investigating their performance on the CBT skills tasks. It was hoped that this would provide useful information on their ability to engage in the cognitive components of CBT, and potentially provide a way to assess suitability prior to beginning a course of

therapy. Furthermore, this is the first study to include a comparison group of typically developing children. Although the findings from the current study do not suggest that children with ABI are unable to engage in CBT, it does highlight that they are likely to find successful participation in CBT significantly harder than typically developing children; and are likely to require tailored adaptations beyond those already provided for young children with mental health difficulties.

In the studies that have been previously conducted, where reported, participants have had a minimum IQ of 75. This is an important consideration as 3 (17%) children fell below this cut-off in the current study, with the lowest IQ reported to be 54. When IQ was controlled for in the current study there was no longer a significant difference between the groups, suggesting that IQ is a strong predictor of performance on the CBT tasks. This has also been highlighted in previous studies (Doherr et al., 2005; Quakley et al., 2004; Reynolds et al., 2006). This raises an interesting debate as to whether IQ should be considered as a covariate. It has been demonstrated that accidental injuries (such as TBI) in children are more common among poorer families in socially deprived areas (Beattie et al., 2001; Haynes et al., 2003; Reading et al., 1999); which is associated with poorer cognitive development and lower IQ in children (Yoshikawa, Aber, & Beardslee, 2012). However, IQ is also commonly impacted upon following brain injury, with research indicating that children with ABI frequently demonstrate significantly poorer performance on measures of intelligence than normative samples (V. Anderson, Catroppa, Morse, Haritou, & Rosenfeld, 2009; Crowe et al., 2012; Westmacott, Askalan, Macgregor, Anderson, & Deveber, 2010). In particular, persistent deficits in IQ appear to be especially likely among children with severe brain injury and those injured early in life (Anderson & Yeates, 2014). Therefore, if

IQ is impacted on following brain injury, and this has been shown to significantly impact on CBT task performance, then it is an important consideration and should potentially not be regarded as a covariate in the current study. This view is supported by Dennis et al. (2009) who argue that IQ should not be considered a covariate in cognitive studies of neurodevelopmental disorders and acquired brain injury.

Nonetheless, it is the opinion of the author that this provides valuable information within a clinical setting. The current findings suggest that CBT task performance appears to be associated with global deficits (i.e. IQ) as opposed to specific cognitive deficits (such as EF). As IQ profiles vary significantly following ABI, with some children relatively unaffected and others showing significant impairment (Thaler et al., 2010), this may provides clinicians with some insight as to which children may be more likely to find engagement in CBT challenging following a brain injury.

Following on from this finding, an area that is less well researched is what cognitive abilities may be required to enhance a child's ability to engage in CBT. This is what the secondary hypotheses aimed to explore.

4.2.2 Hypothesis 3: Children in both groups with mental health or behavioural difficulties will demonstrate significantly poorer performance on the CBT skills tasks. Based on previous research outlined below, it was hypothesised that mental health or behavioural difficulties would negatively impact on the child's performance on the CBT tasks. However, the findings in the current study did not support this hypothesis.

Much of the previous research exploring children's ability to engage in CBT using CBT skills tasks has recruited children from non-clinical populations. However, in a study by Reynolds et al. (2006) it was identified that children deemed

to be ‘at risk’ of mental health problems performed significantly worse on the tasks than children at ‘low risk’ of mental health problems. This finding suggests that it may be the children with mental health difficulties, (the intended recipients of CBT), who are less likely to derive as much benefit from this intervention. Furthermore, evidence suggests that CBT as a treatment for externalising disorders, (often characterised by behavioural difficulties, such as conduct disorder, anti-social behaviour and ADHD) lacks efficacy (Bennett & Gibbons, 2000; Grave & Blissett, 2004).

Both mental health disorders and behavioural difficulties are commonly reported following a paediatric brain injury. New and persisting behavioural problems, including inattention, disinhibition, poor self-regulation and reduced insight, are estimated to affect 35% to 70% of children who have sustained a severe TBI (Ylvisaker & Feeney, 2007). Although evidence on the psychological and emotional consequences following paediatric brain injury presents more of a mixed picture, high incidence rates of anxiety, OCD and PTSD have been reported (Grados et al., 2008; Levi & Drotar, 1999; Luis & Mittenberg, 2002; Max et al., 2011); although depression is less frequently reported (Hawley, 2003; Kirkwood et al., 2000; Max et al., 2012). Based on this, the results of the current study, particularly with regards to the ABI group are somewhat unexpected and not in line with previous research.

As the comparison group were recruited from a non-clinical population, this non-significant finding is likely to reflect that these children fell in the normal range for anxiety and depression, and did not display any significant behavioural difficulties. The fact that children known to be in contact with mental health services were excluded in the comparison group but not in the ABI group could present a

limitation with regards to exploring this hypothesis. However, no relationship was found for either group in relation to performance on the CBT tasks, and further analysis revealed that there were no significant differences in mental health between the comparison and ABI group as rated by the child on the Spence Children's Anxiety Scale or the Mood and Feelings Questionnaire. A substantial proportion of the children in the ABI group were not actively under the care of a service, and therefore the children in this particular sample may not have been experiencing any notable mental health difficulties. Furthermore, the use of self-report measures has been criticised for individuals with brain injury as they often lack insight into their difficulties (Bond, 2008), which may provide an alternative explanation for these findings. However, reliance on parent-report measures for internalising disorders is also problematic, as it can lead to symptoms which are not evident to the parent being missed. Finally, it was noted by the researcher that many of the questions in the Spence Children's Anxiety Scale appeared too difficult for children in the ABI group, which may have led to difficulties being under-reported. Further limitations of these measures which may have potentially impacted on this finding are outlined in sections 4.3.4.4 and 4.3.4.5.

4.2.3 Hypothesis 4: Children in both groups with high parent-rated levels of executive dysfunction will demonstrate significantly poorer performance on the CBT skills tasks. Executive functioning (EF) comprises a range of cognitive abilities, which are likely to be involved in most CBT exercises. Previous research has indicated that good executive skills are important for successful engagement in CBT (Mohlman & Gorman, 2005). These skills develop progressively throughout childhood, and it is suggested that executive functioning is comprised of a number of specific skills, each with a different developmental

trajectory, and each maturing at different rates (V. Anderson, 1998). Due to this rapid development during childhood, these skills are particularly vulnerable to disruption from brain injury (Ewing-Cobbs et al., 2004).

It was therefore hypothesised that children in both groups with high parent-rated levels of executive dysfunction would demonstrate significantly poorer performance on the CBT skills tasks. This was partially supported, as it was found that better EF skills positively impacted on performance on the TFTB link tasks in the comparison group. This is consistent with what would be expected, as this task is likely to require EF abilities. For example, the task requires children to relate one idea to another (including being able to relate the present to the past), and to identify connections between different events (Diamond, 2006). It has been highlighted that the CST appears to be a simpler task, especially for the children in the comparison group, and is therefore unlikely to place significant demands on EF. This may explain the non-significant finding in this group between EF and performance on the CST.

However, non-significant findings were reported in the ABI group between both CBT skills tasks and EF, which is surprising given that EF difficulties are commonly reported after childhood brain injury (Mangeot et al., 2002). There are a number of possible explanations for this. Firstly, EF is most commonly reported after TBI, rather than other types of ABI, as the nature of traumatic injuries tends to involve frontal lobe damage (Mattson & Levin, 1990; Stuss, 2011), the area of the brain associated with EF (Stuss & Knight, 2013). In the current study, 61% of children had sustained a TBI and the remaining 39% included a range of other aetiologies. Therefore, if the study were to be replicated using a sample of children who had only sustained a TBI, a relationship between EF and performance on the

tasks might potentially be demonstrated. The age of the sample used in the current study may also account for the non-significant finding as research suggests that the different domains of EF do not approach maturity until between 11 and 13 years of age (the upper age limit of the current sample). Furthermore, the concept of “growing into” deficits was outlined in section 1.2.4. This proposes that the impact of frontal lesions, associated with EF, may not become fully apparent until adolescence, even if they occurred much earlier in life (Chapman, 2006). Therefore, future research would benefit from exploring the potential impact of EF on CBT task performance with an older sample of children. Finally, this non-significant finding may reflect the parent-rated measure that was used. Parental report can be subject to bias, with difficulties often being over or under-reported (Arnold & Feldman, 1981). Finally, EF skills are notoriously difficult to accurately assess, especially in children, and this was demonstrated by McAuley et al. (2010) who found no relationship between the BRIEF and a number of performance based tasks of EF. This is outlined in more detail in section 4.3.4.4.

4.2.4 Hypothesis 5: Children in both groups with high levels of parent-rated empathy will demonstrate significantly better performance on the CBT skills tasks. Empathy can be defined as the ability to feel or imagine another’s emotional experience, and it encompasses both affective and cognitive components (McDonald & Messinger, 2012). As mentioned previously, evidence suggests that CBT is less effective for externalising disorders, and in addition to behavioural difficulties these disorders are also characterised by a reduction in empathy and ToM (Grave & Blissett, 2004). Furthermore, the literature on children with Autism Spectrum Disorders (ASD), a condition also commonly associated with impairments

in ToM and empathy, highlights difficulties applying traditional CBT to this population (Baron-Cohen et al., 1985; J. J. Wood et al., 2009).

Despite a current lack of research regarding the potential role of empathy in successful CBT engagement, it was hypothesised from the findings outlined above that there would be a significant positive relationship between empathy and performance on the CBT skills tasks in both groups. This hypothesis was partially supported. A significant positive relationship was found between empathy and performance on the CST in the ABI group, and in the comparison group a significant positive relationship was found between empathy and performance on the TFTB link tasks. This latter finding is logical given that successful completion of the TFTB link tasks appears to require children to empathise with the characters in the stories and the situations they are presented in. The fact that no relationship was found in the comparison group between empathy and the CST may reflect the limitations of this measure with this group. These limitations are discussed further in section 4.3.4.1.

The ability to recognise and identify emotions in others is a fundamental skill in order to be able to empathise, which may explain the positive relationship between higher levels of empathy and performance on the CST in the ABI group. However, research suggests that the ability to empathise is commonly affected after a brain injury (S. W. Anderson et al., 1999; de Sousa et al., 2011; R. L. Wood & Williams, 2008), and it has been highlighted that children with ABI may struggle as situations become more complex and more skilful application of these abilities is required (Tonks et al., 2009). This may explain the lack of a significant relationship with the TFTB link tasks, as this is likely to require greater levels of empathy in order to improve performance. This is supported by the finding that parents of children in the

comparison group reported significantly higher levels of empathy than parents of children in the ABI group.

4.2.5 Hypothesis 6: Children in both groups who demonstrate theory of mind ability will perform significantly better on the CBT skills tasks. Due to the similarity between empathy and ToM, it was also hypothesised that there would be a significant positive relationship between ToM ability and performance on the CBT skills tasks. Three children in the ABI group (17%) were not successful on the first order theory of mind task, indicating they may struggle to make inferences about the emotions, beliefs and desires of other people. Although this finding is consistent with the wider adult literature that sustaining a brain injury, in particular a traumatic brain injury, commonly results in impairments in theory of mind (Bibby & McDonald, 2005; Martín-Rodríguez & León-Carrión, 2010); the findings presented in the child literature regarding successful completion on ToM tasks is mixed. Many previous studies exploring ToM in children following ABI have suggested that they are able to successfully complete first order but not second order ToM tasks (Snodgrass & Knott, 2006; Turkstra et al., 2004; Walz et al., 2009). However, Walz et al. (2010) provides evidence contrary to this, supporting the finding from the current study.

This hypothesis was partially supported as this apparent lack of ToM negatively impacted on the child's ability to differentiate thoughts, feelings and behaviours in the CST. However, no relationship was found between ToM ability and the TFTB link tasks. This finding is unexpected given that successful completion of this task appears to require children to understand the mental states of the characters in the stories. This finding could potentially relate to a lower overall performance on the TFTB link tasks compared to the CST in the ABI group. No

previous research has directly investigated the potential impact of ToM on successful engagement in CBT, but this finding may indicate that children who do not possess first level ToM skills may find participation in CBT more difficult.

However, this finding should be interpreted with caution as false belief tasks have been criticised as not being a pure assessment of ToM, but instead rely on other cognitive modalities such as attention, working memory, and good verbal abilities, all of which can be impaired following brain injury. The children who did not successfully complete the ToM task all demonstrated poor verbal abilities on the WISC-IV. This may suggest that they were unsuccessful on the ToM task as they were unable to meet the task demands, and not because they lack the ability to make inferences about the mental states of others. A full critique of the ToM measure is provided in section 4.3.4.2.

4.2.6 Hypothesis 7: Children in both groups who demonstrate higher levels of metacognition will perform significantly better on the CBT skills tasks.

Metacognition can be defined as any knowledge or cognitive process that is involved in the appraisal, monitoring or control of cognition (Flavell, 1979). When considering the role of metacognitive abilities in CBT, it is believed that successful engagement requires clients to be able to describe, distinguish between, and reflect on their own thoughts, feelings and behaviours (requiring metacognitive knowledge); whilst metacognitive regulation (monitoring, planning, allocation of attention) will be involved in most CBT tasks (Reynolds et al., 2006). Although no research has explored the relationship between metacognition and the CBT skills tasks, it would seem that the abilities outlined above would be necessary for successful completion of the tasks.

Based on this, it was hypothesised that children with higher levels of metacognition would perform better on the CBT skills tasks. In particular, it was suggested that the ‘cognitive monitoring’ subscale was particularly pertinent in relation to the tasks and engagement in CBT more generally. However, this was not supported as non significant results were reported on the whole scale and the subscale for both groups. It is possible that this finding reflects limitations with the measure used to assess metacognition. This was a child self-report measure, not previously used with the brain injury population. Despite adequate levels of internal consistency found for the current study, it was noted by the researcher that the abstract concepts presented in this measure often appeared too complex for many of the children, especially those with ABI.

Furthermore, in a previous study which compared children and adolescents with clinical anxiety disorders with a non-clinical sample, age-based differences were found on the cognitive monitoring subscale, with adolescents reporting greater awareness of their thoughts than children (Bacow et al., 2009). Therefore significance may not have been achieved in the current study due to the age range included. The potential limitations of this measure are outlined below 4.3.4.5.

4.3 Study Limitations

The validity of these findings, and the potential theoretical and clinical implications, should be considered in the light of several methodological limitations.

4.3.1 Design. The between groups design was a strength, as it enabled the study to compare the performance of children with ABI on CBT skills tasks in relation to typically developing children. However, it might have been beneficial to include a second comparison group of children with orthopaedic injuries.

Orthopaedic injury (OI) comparison groups are commonly included in this field of

research (Janusz et al., 2002; Levi & Drotar, 1999; Luis & Mittenberg, 2002; Walz et al., 2009) as they are felt to represent a more ecologically valid comparison. As mentioned previously in section 1.2.1, research suggests that children who present at Emergency departments with accidental injuries (including TBI and OI) are more likely to be from socially deprived areas (Beattie et al., 2001; Haynes et al., 2003; Reading et al., 1999), demonstrate higher levels of behavioural and emotional symptoms, and live in single or step parent households (Lalloo et al., 2003). Unfortunately however, this was beyond the scope of the current study due to limited time and resources. This would be a useful addition if this study was to be extended or replicated.

4.3.2 Recruitment. Recruiting children with brain injury represented a number of significant challenges, and the current study is somewhat limited by a small sample size. However, this is not uncommon in this field of research (Hanten et al., 2000; Henry, Phillips, Crawford, Ietswaart, & Summers, 2006; Snodgrass & Knott, 2006; Tonks et al., 2007). Additionally, the relatively narrow age range required also limited the number of potential participants, as many children in services were found to be over the age of 12. Nonetheless, considerable efforts were made by the researcher to recruit the required number of participants. Approval was gained from three separate Research and Development sites, and numerous charities and organisations were frequently contacted. In addition to information being provided by clinicians, the study was also advertised nationally in relevant newsletters and via appropriate social media to make contact with as many potential participants as possible. As a result, children were recruited from a wide geographical area including Cambridgeshire, Norfolk, Essex, London, Edinburgh, Kent, Oxfordshire, and Hertfordshire.

A number of studies in this area suggest that lower SES is a predictive variable of mental health difficulties following a brain injury (Max, Lindgren, Robin, et al., 1997; Max, Smith Jr, et al., 1997). However, only minimal data was collected in this study (occupation of parents) on which to estimate SES. It would have been beneficial to collect further details to provide a more accurate estimate of SES, using a formal measure such as the Four Factor Index of Social Status (Hollingshead, 1975).

4.3.3 Participants.

4.3.3.1 ABI group. This study was initially designed to compare children with traumatic brain injury and typically developing children. Participants with TBI are frequently used in this field of research as it is the most common cause of brain injury in children (Hawley et al., 2003). Furthermore, it creates a more homogenous sample likely to have similar patterns of neuropathology, allowing more accurate conclusions to be drawn (Robson, 1997). The hypothesis relating to executive functioning is also particularly pertinent to children with traumatic injury. As mentioned previously, it is the nature of these traumatic injuries, often causing damage to the frontal lobes, which result in difficulties with EF.

Unfortunately, due to significant recruitment difficulties (as detailed above in section 4.3.2), the inclusion criteria had to be expanded to include all types of ABI. It is acknowledged that with a mix of aetiologies, the resulting neuropsychological difficulties are expected to differ. Furthermore, it is now more difficult to adequately explore the impact of EF on CBT skills as children who have sustained a brain injury as the result of infection or anoxia are less likely to exhibit specific deficits in EF. In addition, it was not possible to select TBI participants with specific areas of focal injury, and therefore conclusions cannot be drawn about whether specific areas of

injury (such as frontal lobe damage) are related to performance on the CBT skills tasks. This would be an interesting avenue for further research.

For some participants, particularly those who were recruited via charities or advertising (with no access to medical records) it was difficult to clarify the diagnosis, and was often difficult to define severity of injury without knowledge of the Glasgow coma score or length of post traumatic amnesia. However, it was found that (where applicable) parents did know how long their child had been in a coma, and this was used to judge whether the inclusion criteria was met. It is unclear whether one participant in the sample formally met the criteria. The child was born with an underlying mitochondrial condition, although she developed normally and was reaching appropriate developmental milestones until the age of 2. She then experienced significant seizures which have resulted in an ABI. However, this aetiology is complex as seizures themselves can indicate neuropathology (i.e. the neuropathology causes the seizure) but they can also lead to neuropathology. Despite this uncertainty, a pragmatic decision was made to include her in the study due to limited numbers of participants available.

Another consideration is that participants in this group were much more diverse than the comparison group in terms of ethnicity and potential SES (based on parental occupation). As children in this group were recruited from a much wider geographical area, it is possible that pre-morbid IQ and cognitive functioning may have differed between the two groups, irrespective of ABI.

4.3.3.2 Comparison group. A large number of schools were approached, and all but one was in Cambridgeshire. Cambridge is considered to be an affluent city, with a high proportion of academic and professional parents. As there was no direct gain for participating in the study, it is likely that only parents with an interest in

research returned a consent form to the school, potentially leading to a sampling bias. Although there was also no direct gain for children in the ABI group, parents commonly stated that they wished to “give something back” in return for the help and support they had received from services; and were keen to contribute to research to potentially help others going through similar experiences in the future.

This sampling bias in the comparison group resulted in a lack of diversity, as the majority of children were deemed to be white, British and of middle class. Although it appeared not to be a confounding variable, there was a significant difference between the groups in terms of SES. Research suggests that there is strong relationship between SES and cognitive ability as measured by IQ and school achievement beginning in early childhood (Hackman & Farah, 2009). In a study by Hart and Risley (1995) it was found that the average vocabulary size of 3-year-old children from professional families was more than twice as large as for those receiving government income support.

4.3.4 Measures.

4.3.4.1 CBT tasks. A key limitation is that there is currently a lack of research demonstrating the psychometric properties for these measures despite them being used in several studies. The tasks require children to comment on the thoughts, feelings and behaviours of others. Although this is a common element used to socialise children to the CBT model, when considering their ability to engage in CBT it could be equally important to ascertain if they are able to identify and make links between their *own* thoughts, feelings and behaviours. Although the tasks have reasonable face validity, they have not been linked to children’s performance in CBT and thus we do not know what level of performance is necessary for children to engage successfully in CBT (Quakley et al., 2004). However these measures, and adapted

versions, have previously been employed in a number of studies (Bruce et al., 2010; Doherr et al., 2005; Quakely, Coker, Palmer, & Reynolds, 2003b; Quakley et al., 2004; Reynolds et al., 2006; Sams et al., 2006). It has been demonstrated that these measures are sensitive to developmental differences in scores between different ages (from 4 to 7); and have also been shown to significantly correlate with each other suggesting the tasks measure similar constructs (Quakley et al., 2004).

The use of the CST in this study is a limitation as it was found to be too simple for children in this age group, evidenced by the majority of children in the comparison group performing at ceiling. Previous research has demonstrated that most children are successful at this task, both with and without cues, by the age of 7 (Quakley et al., 2004). However, the rationale for its inclusion was to reduce confounding variables relating to developmental factors when comparing the two groups. Nonetheless, it presented challenges with regards to analysis, and in retrospect a slightly more complex task could have been used. The thought to feeling and thought to behaviour linking tasks appeared to be much more appropriate for the children in the comparison group, whilst still at an appropriate level for children with ABI leading to a better comparison between the groups.

4.3.4.2 Theory of mind measure. A brief assessment of ToM was included in this study as it has been suggested that the task demands are similar to that of the TFLT and the TBLT (Quakley, 2002). However, only a first order ToM task was included. This proved to be a limitation as the task was found to be too simple for the majority of participants, particularly children in the comparison group. In retrospect it would have been beneficial to also include a second order ToM task, which children could have progressed to upon successful completion of the first order task. This would have allowed for a more useful and accurate comparison between the two groups. Due to the number of measures being included in this study,

and the length of assessment, a conservative approach of only including one ToM measure was taken.

Despite being widely used, false belief tasks have been criticised by some as not being a true assessment of ToM. P. Bloom and German (2000) suggest other skills are needed to complete these tasks besides ToM, such as attention, working memory, and good verbal abilities. Therefore, a child may fail as they are not able to meet the task demands, not because they do not understand the mental states of others. This has important implications, particularly for the ABI group, as impairments in these other cognitive domains may be present. The results relating to ToM should therefore be interpreted with caution.

4.3.4.3 Measure of intelligence. This study used a valid and reliable measure of intellectual functioning. It was, however, an abbreviated two subtest version which has not yet been widely used in research. Nonetheless, it has been found to yield an estimated Full Scale IQ with a reliability of .926 and a correlation with the Full WISC-IV of .876 (Crawford et al., in preparation). This version includes the Vocabulary and Matrix Reasoning subtests. One potential limitation of using this particular short form is that English was not the first language of four children in the ABI group. Although they had proficient use of English, this may still have led to an underestimation of their full scale IQ.

4.3.4.4 Parent report questionnaires. A potential limitation of all parental report questionnaires is that they are highly subjective and prone to bias (Arnold & Feldman, 1981). Parents may not be aware that their children think, feel or behave in certain ways; and in some cases they may want to provide socially desirable answers. This is particularly relevant when considering the Children's Empathy Quotient, which contains statements such as "my child sometimes pushes or pinches someone

if they are annoying them” and “my child has been in trouble for name-calling or teasing”. Despite this potential limitation, a critical review conducted by Lovett and Sheffield (2007) suggested that although behavioural measures of empathy appear to have face validity, most are not standardized and lack adequate psychometric properties. Furthermore, they highlighted that child self-report measures of empathy are also prone to social desirability, and difficulties with valid and reliable measures have been identified (B. K. Bryant, 1982; Dadds et al., 2008).

There can also be benefits to using parental self-report measures. Firstly, parents may be able to provide information that children themselves are unable to objectively report. This may be particularly relevant to the assessment of executive functioning which incorporates a complex set of abilities which are still developing during childhood. A further benefit of collecting information via parental self-report is that it does not rely upon the reading and comprehension abilities of the children assessed (Auyeung et al., 2009). For this study, it was necessary to include parental self-report to gain information from a range of perspectives and to reduce the length of the assessment.

A number of difficulties have been identified with the assessment of executive functioning, particularly in children. The tasks commonly utilised to measure EF in children have been developed for use with adults, and frequently lack normative information with respect to developmental expectations (Todd, 1996). It is believed that tasks need to include several aspects in order to successfully assess EF, such as being novel and complex (Walsh, 1978); however these tasks are likely to place demands on other cognitive domains. For example, the Controlled Oral Word Association Test (COWAT) is a commonly used measure of EF in paediatric

research. However, this task requires good verbal skills, such as phonological awareness, which are not well developed in younger children (V. Anderson, 1998).

Although some measures are thought to adequately assess EF in children better than others, such as the Tower of London, the researcher felt that a parent report measure of EF would be more appropriate. Once again, consideration of the length of assessment was influential in this decision. The BRIEF is a widely used and standardised measure of EF. Importantly, it has also been shown to have adequate construct and criterion validity in the assessment of children with brain injury (Donders et al., 2010), and it was found to have excellent internal consistency for both groups in the current study. However, a potential limitation of this measure was highlighted by McAuley et al. (2010) who explored the relationship between the BRIEF and a number of performance based EF tasks (including the Wisconsin Card Sorting Test, Trail Making Test Part B, and verbal fluency) in children with brain injury. They found that although both BRIEF indices were strongly related to parent and teacher ratings of behavioural disruption and impairment, neither was associated with the child's scores on the performance-based tasks of executive function. This highlights the ongoing difficulties of accurately measuring EF skills in children, and further research is required in this area.

The final parental self-report measure used in this study was the SDQ. The SDQ is a widely used psychometrically reliable clinical screening measure, used with a range of clinical populations, including children with ABI (Tonks et al., 2011; Tonks et al., 2010). Although it was found to have poor internal consistencies for both groups in the current study, this is likely to reflect the number of different domains covered in the measure.

4.3.4.5 Child self-report questionnaires. Although used with a range of clinical populations, to the best of the researcher's knowledge, the Spence Children's Anxiety Scale (SCAS), The Mood and Feelings Questionnaire (MFQ) and the Metacognition Questionnaire for Children (MCQ-C) have not previously been used in research with children with ABI. Despite lacking psychometric properties for this population, high internal consistencies were found in this study for all three measures (SCAS = .92, MFQ = .81, MCQ-C = .86), suggesting they are reliable for use with children who have experienced ABI. Nonetheless, prior to undertaking the study it would have been advantageous to have piloted the use of these measures on a small sample of children, particularly those who have sustained a brain injury, to assess the suitability of these measures for this population.

Furthermore, the use of self-report measures in brain injury populations has been criticised. Problems with insight are common following brain injury, and as a consequence there is sometimes a distortion in the individual's awareness of difficulties (Bond, 2008). Furthermore, these measures are quite lengthy, and they placed demands on children's ability to pay attention and concentrate for a significant amount of time. It also noted by the researcher that many of the questions appeared to be too complex and abstract for children with ABI, in particular the SCAS and the MCQ-C. For example, on the SCAS children in both groups often appeared to misunderstand the questions relating to obsessive-compulsive tendencies, potentially resulting in an under or over-estimation of difficulties. A significant amount of support and scaffolding was often required from the researcher, particularly with children in the ABI group, to allow completion of these. Even with support, these measures still require the child to have good verbal

comprehension abilities, and for a number of children in the ABI group English was not their first language.

Furthermore, a potential limitation of the MFQ is that many of the items overlap with consequences of brain injury, such as difficulty concentrating, difficulty making decisions, and feeling restless. Therefore, it is possible that mood issues may also be overestimated with children in the ABI group. The findings relating to these measures must therefore be interpreted with some caution.

4.3.5 Statistical analysis. Due to children in the comparison group scoring almost at ceiling for one of the primary measures, transformations were not felt to be appropriate to overcome this non-normal distribution. Therefore, relationships between the study variables were examined using a mixture of bootstrapping and non-parametric analyses. As these tests are considered to be less robust than their parametric counterparts, the power to accurately detect significant effects was reduced by increasing the likelihood of Type II errors (Field, 2013). Therefore, the lack of hypothesised findings between performance on the CBT tasks and metacognition, mental health and behavioural difficulties, and executive functioning (in the ABI group) should be interpreted with some caution. However, a number of strong correlations were found, and these remained significant following Bonferroni adjustments.

A further difficulty was the lack of an appropriate non-parametric statistical test to control for covariates. Although an ANCOVA was attempted in relation to the primary measure, it was thought that applying a parametric test to non-normally distributed data did not necessarily provide accurate results, and was therefore not attempted for the secondary analyses. As not knowing the impact of potential confounding variables is a limitation, an alternative approach may have been to use

mediation analysis. However, bootstrapping would need to have been employed due to the small sample size.

A further limitation is that the study was slightly underpowered on the primary research questions based on the original power calculation. In addition, although exploratory in nature, the small sample size for the secondary analyses may have increased the likelihood of both Type 1 and Type II errors.

4.4. Theoretical Implications

The current study has revealed that children who have sustained a brain injury demonstrate significantly poorer performance on CBT skills tasks, suggesting that they are likely to find engagement in CBT more challenging. Within the constraints of the methodological limitations that have been highlighted, a number of tentative theoretical implications can be made based on the findings.

An outlined in section 4.2.1, it appears that IQ significantly contributed to performance on the tasks, as a difference between the groups was no longer found once IQ was controlled for. This is consistent with previous research using these tasks, which have also indicated IQ as a strong predictor of performance (Doherr et al., 2005; Quakely et al., 2003b; Reynolds et al., 2006). Furthermore, these CBT tasks have been used with adults with intellectual disability to assess potential suitability for CBT (Bruce et al., 2010). Sams et al. (2006) assessed 59 adults with a mean IQ of 58, and found considerable variability on performance on the CST. In particular, being able to identify feelings and behaviours, but interesting not thoughts, was found to be significantly correlated with both verbal and full-scale IQ.

These findings are important in relation to the current study, as IQ is commonly impacted upon by brain injury, with research indicating that children with

ABI frequently demonstrate significantly poorer performance on measures of intelligence than normative samples (Crowe et al., 2012; Westmacott et al., 2010). This has implications when considering the findings from the previous studies investigating the efficacy of CBT for children with brain injury. The key papers to date have suggested that CBT can be an effective intervention for the treatment of emotional and behavioural difficulties following childhood brain injuries; however it appears that only children with an IQ greater than 75 have been included in the research (Feeney & Ylvisaker, 2003, 2006; Pastore et al., 2011; Poggi et al., 2009). It is likely that a proportion of children seeking psychological intervention following brain injury may fall below this cut-off, suggesting that successful engagement in CBT may be especially challenging for these children.

Furthermore, previous research has suggested that children deemed to be ‘at risk’ of mental health difficulties performed more poorly on the CBT skills tasks than children considered to be at ‘low risk’. Although this was not supported in the current study, due to no significant mental health difficulties being reported by either group, it is important to consider that children with brain injury seeking psychological support are likely to be experiencing mental health difficulties, in addition to potentially having a low IQ, both of which are believed to impact on CBT engagement.

The secondary analyses from the current study also suggest that performance on the CBT tasks is impacted on more significantly by social emotional processing issues (such as ToM and empathy) rather than specific cognitive processes (such as EF and metacognition). Although many of these cognitive abilities are associated with the frontal lobes, it has been suggested that social cognition can be viewed as a separate specialised domain that can be differentiated from more general cognitive

skills such as attention and executive function (Beauchamp & Anderson, 2010). The current findings might provide tentative support for this distinction. However, CBT skills tasks only assess a sub-set of skills believed to be required for CBT, and it is possible that the tasks tap into the social more than cognitive modalities.

In relation to ToM specifically, the findings from the current study indicate that an impairment in this ability negatively impacts on CBT task performance. This is consistent with previous research which has investigated the applicability of CBT with other populations characterised by ToM impairment, such as those with Autism (J. J. Wood et al., 2009). In addition, the majority of studies investigating ToM ability in children following brain injury have suggested that they are able to successfully complete first order ToM tasks, but demonstrate poorer performance compared to a non-injured controls on the more advanced ToM tasks (Snodgrass & Knott, 2006; Turkstra et al., 2004; Walz et al., 2009). Although limited by a small sample size, the current study reports results which may be contrary to this view, highlighting that not all children may be competent on first order ToM tasks. The current study's findings are in line with those reported by Walz et al. (2010).

With regards to executive functioning, it was found that children in the comparison group with higher levels of parent-rated EF performed significantly better on the CBT skills tasks. This finding may provide further support that EF is an important skill for enhancing engagement in CBT. In particular, good EF is likely to relate to the cognitive aspects of CBT, including problem solving and decision making, goal directed behaviour, relating one concept to another, self-monitoring (requiring inhibition), and cognitive flexibility (Diamond, 2006; Mohlman & Gorman, 2005). Due to the range of aetiologies in the ABI group, potentially resulting in less reported EF impairments than may be found in a homogenous TBI

group, there are limited data available on which to draw conclusions about the impact that EF may have on CBT ability for children who have sustained a brain injury. Exploring the relationship between these factors in a larger sample of children with TBI who are exhibiting difficulties with EF would be a beneficial avenue for future research (outlined further in section 4.6).

4.5 Clinical Implications

Cognitive behaviour therapy is now one of the most extensively researched child therapies, and a number of reviews suggest that it is an effective intervention for a wide range of psychological disorders that arise during childhood (Cartwright-Hatton et al., 2004; Grave & Blissett, 2004; Kendall & Panichelli-Mindel, 1995). There is also emerging evidence suggesting that CBT may be a beneficial treatment for children following a brain injury (Feeney & Ylvisaker, 2006; Pastore et al., 2011; Poggi et al., 2009); although this requires considerably more investigation. The primary finding of the current study highlights that children with brain injury are less able to identify and link thoughts, feelings and behaviours compared with typically developing children. This suggests that children will find engagement in CBT more difficult following a brain injury, thus having implications for its delivery in clinical practice.

Research has shown that although typically developing children are able to engage in, and successfully utilise aspects of CBT from approximately age 7 years onwards, adaptations are commonly required to make it accessible. Furthermore, research has highlighted that the cognitive element of CBT is commonly lacking with children, and the mechanism of change is more often the behavioural component (Quakely et al., 2003). This is also consistent with the research

investigating the use of CBT after brain injury in children, which have also primarily employed behavioural interventions (Feeney & Ylvisaker, 2006).

Although in the current study children with brain injury performed worse on the CBT skills tasks than typically developing children, the majority were still able to demonstrate basic skills in distinguishing amongst thoughts, feelings and behaviours which could be further developed and built upon by coaching and support from therapists. The concept of scaffolding, as described by Vygotsky (1962), could be of considerable practical value to therapists working with children with brain injury. Previous research using the CBT skills tasks have indicated that the use of visual cues, such as using glove puppets and post boxes can significantly improve performance (Quakley et al., 2004). Adaptations for children with ABI would need to be tailored to the individual, based on the nature of the injury and the resulting cognitive sequelae. Furthermore, a study by Bruce et al. (2010) explored whether adults with intellectual disability could learn core skills needed for CBT. The results revealed that a brief standardised training session led to significant improvements in participants' ability to link thoughts and feelings, and this skill was generalised to new material. The findings from this study suggest that some preliminary training could enhance CBT engagement, which may also be beneficial for children with ABI.

Once the predictive validity of the CBT skills tasks in relation to CBT engagement has been formally established, these tasks could be used by clinicians to assess a child's suitability for CBT prior to commencing a course of therapy. Furthermore, the current study found that for children with ABI, higher levels of empathy positively impacted on their ability to identify thoughts, feelings and behaviours; whereas an apparent lack of theory of mind negatively impacted on this

task. IQ was also found to be a strong predictor of performance. Therefore, if clinicians were to assess IQ, empathy and ToM prior to therapy, this may provide a further indication of whether the child will be able to engage in CBT, or may be a useful consideration in relation to adapting the cognitive and behavioural techniques used.

These findings are also compatible with the idea of placing a greater emphasis on protective factors to build resilience in children after brain injury rather than focussing on a 'deficit' model (Tonks et al., 2011). Strategies used to develop resilience, and to support children to overcome adversity are now being introduced in both child mental health services and schools. It has been suggested that social interaction and friendships are an essential component of emotional wellbeing (Raja et al., 1992), yet brain injury can have a significant detrimental impact on peer relationships, and increased social isolation from peers poses a considerable threat to children's mental health in both the short and long term (Ross, Dorris, et al., 2011). Therefore, if brief assessment or screening of empathy and ToM were routinely conducted, not only might this provide a better indication of CBT engagement, but if found to be relatively preserved following brain injury then these skills could be strengthened and built upon in therapy to help buffer children against some of these social difficulties and thus promote emotional wellbeing.

4.6 Future Research

Given the limitations outlined in section 4.3 (including issues with the sample, measures and the methods used to analyse the data) the current study should be viewed as an exploratory pilot study, and as such the findings should be interpreted with some caution. Nonetheless, many potential avenues of further exploration have been highlighted with regards to the application and suitability of

CBT, both with typically developing children and children with brain injury. Even though the CBT skills tasks have been used in a number of previous research studies and appear to have good face validity, it is important to determine whether these discrimination and linking tasks have predictive validity in terms of how successfully children engage in CBT. If norms were established with clinical populations, the tasks could also be used to assess children before therapy and may highlight areas of meta-cognitive deficit that could be targeted during treatment.

As discussed by Quakley (2002), future research could also focus on adapting these tasks to assess the child's ability to identify and link their own thoughts, feelings and behaviours, rather than those of others. Additionally, the current study highlighted a number of potential limitations with the measures that were used. Many of these measures have not previously been used to assess children with brain injury, and therefore future research to examine the psychometric properties of the measures within this population would be valuable.

Although the CBT skills tasks have not formally been used on children with mental health difficulties, research has suggested that children "at risk" of mental health problems demonstrated significantly poorer performance on the tasks than children rated at "low risk" (Reynolds et al., 2006). As previous research has highlighted that children with ABI may experience similar levels of emotional distress as children accessing mental health services (Tonks et al., 2010), comparing children in these groups on their performance on the CBT skills tasks might be a valuable line of inquiry.

Based on some of the significant findings reported in the current study, further research may be useful to explore how deficits in different cognitive modalities (in particular empathy and ToM) may impact on successful participation

in CBT. This is particularly relevant for children with ABI, as empathy and ToM skills might potentially enhance their ability to engage in the core aspects of CBT. Additionally, given how commonly executive functioning skills appear to be impacted on by brain injury (Mangeot et al., 2002), and the role that EF is thought to play in CBT (Mohlman & Gorman, 2005), further investigation of the impact of executive dysfunction on engagement in CBT for children with brain injury may be of benefit. This might involve recruiting a more homogenous group of children who have sustained TBI and who are exhibiting EF difficulties. Additionally, it would be beneficial to employ a range of EF measures, which are more sensitive and ecologically valid than the use of a parent-report measure alone which may be subject to bias.

It is clear that the evidence base regarding the efficacy of CBT for children with brain injury is significantly lacking. Although research tends to focus on children with TBI, often due to pragmatic issues, to the author's knowledge only one paper to date has investigated the potential benefit of CBT for children with other types of acquired brain injury. Therefore, focusing on causes such as stroke or infection, and investigating the ability of these children to utilise CBT could be valuable, in addition to continuing to build the evidence base for children with TBI. Furthermore, it would be interesting if future research included children with a broader range of IQ, to reflect the diverse level of ability of children who may be accessing psychological therapy.

A further consideration, highlighted in the general literature regarding the efficacy of CBT for children, is that a wide and diverse range of techniques are often used which results in a lack of treatment specificity. Cognitive behaviour therapy is often used as a broad umbrella term, and this also appears to apply to the child ABI

literature. Future research would benefit from a clearer definition of what the fundamental components of CBT for children are; thus allowing studies to be more rigorous, easier to replicate, and reviewing the efficacy of this treatment in the ABI population would be improved.

4.7 Conclusion

This study aimed to explore whether children who have sustained an ABI have the skills necessary to engage in CBT, by assessing their performance on tasks believed to relate to successful CBT participation. Cognitive behaviour therapy has been shown to be an effective intervention for a wide range of psychological disorders that arise during childhood, yet to date there is very little evidence to suggest whether this is a beneficial therapy for children with ABI. Due to the range of impairments frequently experienced after a childhood brain injury, it was hypothesised that the children in this group would demonstrate significantly poorer performance on the CBT skills tasks compared to typically developing children. Furthermore, performance on these tasks was investigated in relation to a number of cognitive functions thought to enhance an individual's ability to engage in CBT, including executive functioning, theory of mind, empathy and metacognition.

A total of 38 children were included in the study, 18 children with ABI and 20 typically developing children. The findings supported the primary hypothesis, revealing a significant difference between the groups on performance on the CBT skills tasks. This finding indicates that children with brain injury are likely to find engaging in CBT significantly more challenging than those who have not suffered an injury. Furthermore, it was found that higher levels of empathy positively impacted on performance, whereas a perceived lack of ToM negatively impacted on

performance. Contrary to expectations, no significant relationship was found between mental health/behavioural difficulties, executive functioning, or metacognition and performance on the CBT skills tasks. These findings were considered in the light of previous research, and in relation to a number of methodological limitations that were highlighted.

It was suggested that future research to determine whether these discrimination and linking tasks have predictive validity in terms of how successfully children engage in CBT would be beneficial; along with further exploration of how these different cognitive modalities (especially ToM and empathy) may impact on successful participation in CBT.

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Appendix A

Participant Information Sheets

This appendix section contains information sheets for the ABI group and the typically developing group. Where necessary, the appropriate trust logo and patient advice liaison service details for each site were included.



Information sheet for Research (Acquired Brain Injury Group)
Cognitive Behavioural Therapy Skills in Children who have sustained an Acquired
Brain Injury

My name is Jessica Ingham and I am a Trainee Clinical Psychologist based at the University of East Anglia (UEA). My primary research supervisor is Dr. Sian Coker, Clinical Psychologist; and I am collaborating with Dr Anna Adlam, Clinical Psychologist. I am writing to invite your child to take part in a research project. This information sheet is to help you decide if you are happy for your child to participate. Please take time to read it carefully and discuss it with your child. Please feel free to contact me if you require any further information.

What is the purpose of the project?

This project aims to investigate the consequences of acquired brain injury in children aged 8 to 12 years old. I am specifically interested in young children's ability to identify and make links between thoughts, feelings and behaviours, and whether this is harder for children who have suffered a brain injury. In order to investigate this I am asking children from two groups to complete a range of tasks and puzzles. The groups are healthy school children and children who have sustained an acquired brain injury. It is hoped that the results of the project will contribute to our understanding of psychological treatments for children who have sustained a head injury.

Why has my child been invited to participate?

Your child has been asked to participate as they are between the age of 8 and 12 years old, has in the past suffered from a brain injury and because you have stated that it is ok for me to contact you regarding my research.

Does my child have to take part?

No your child does not have to take part in this project. If you decide you do not wish your child to participate then this will have no effect upon the health services they receive.

What will happen if I decide to give consent for my child to take part?

If both you and your child decide that you are happy for your child to take part in the project I will meet with your child for approximately 60 minutes on one occasion either at home, or if you prefer at their school or a clinic they attend. I will ask them to carry out a series of tasks and puzzles. I will make it clear that these are not a test, and that there is no right or wrong answers, but that I am interested in their ideas. It will be explained to your child that they can stop participating at any time should they wish to and they do not have to give a reason why.

The tasks consist asking children to sort cards into different categories, and answer questions on short stories. A short measure of general ability and three brief

questionnaires will also be used. The tasks have been used before in research at UEA with hundreds of children. Feedback so far is that children find the experience engaging and enjoyable. In the very unlikely event that your child becomes distressed in any way whilst participating I will stop the session immediately and notify you or their class teacher. In this situation I would also discuss this with my primary research supervisor.

I will also ask a parent to fill out three brief questionnaires on your child and provide some basic information (e.g. how many people live in the household). This should take no more than 25 minutes of your time. I will ask you to complete these when I visit your child or send these to you via your child's school and ask you to return them using a stamped addressed envelope.

What do I have to do if I am happy for my child to take part?

As your child is under 16, before I can include them in the project I need you to provide written parental consent. I will also ask your child if they are happy to take part and they will sign a form to give their agreement. Even after receiving your consent if your child decides they do not want to take part then they will not be included.

If you and your child are interested in taking part in this project then please fill out the consent to share details form enclosed and return it to me using the stamped addressed envelope provided. I will then contact you to discuss the study and answer any questions and concerns you may have. If you and your child are happy to participate then after this I will arrange to come and visit you and seek written consent and complete the tasks.

Are there any expenses or payment involved in the study?

Your child involvement in the study will not involve any financial expense on your part. I will travel to you and all correspondence that needs to be returned to me will be sent with a stamped addressed envelope. As a thank you for taking part at the end of the study all children will be entered in to a prize draw to win one of two £10 vouchers for a high street store of their choice.

What are the disadvantages and risks of my child taking part?

I do not think there are any significant disadvantages or risks of taking part. It is not anticipated that participation will cause distress in any way. In the very unlikely event of this happening I will discuss this with you and your child.

What are the possible benefits of my child taking part?

There is little direct benefit for your child or yourself from taking part. If your child is engaged with rehabilitation services and you give permission I will share the findings with that service. This may help to increase their understanding of your

child's needs. The information we get from this study will help improve psychological treatment for children who have experienced an acquired brain injury.

Will information be kept confidentially?

I will keep all information private and safe. Data will be kept in a locked cabinet and files on computers will be password protected. No identifying information (such as names) will be included on the data and numbers will be used instead. Participation will be audio recorded and a small random sample of recordings listened to by Dr Anna Adlam. This is to ensure that I carry out the research properly. All recordings will be securely destroyed once this procedure has taken place.

If you do not know information regarding the severity of your child's head injury then I will ask permission from you to consult your child's medical records in order to find out about this information. This is the only information I will request, and if you know or can access this information then I will seek your permission to access your child's records. I will not disclose any personal information about you or your child to others when doing this.

Who has reviewed the study?

All research in the NHS and at the University of East Anglia is looked at by an independent group of people called a Research Ethics Committee, to protect your interests. This study has been reviewed and given a favourable opinion by Cambridge Central Research Ethics Committee.

Thank you for taking the time to read this information sheet. I hope you will decide to allow your child to participate. Should you have any questions I would be very happy to discuss my project further with you and can be contacted on 07976 423 994 or on J.Ingham@uea.ac.uk.

If you would like to speak to someone for independent advice about participating in research in general then you can contact the Patient Advice and Liaison Service on 01223 726774 or pals@cpft.nhs.uk. If you are unhappy with any aspect of this study, or wish to speak to one of my supervisors then they are contactable on 01603 593310.

Many Thanks, Jessica Ingham



Parent & Child Information Sheet (School Group)
Cognitive Behavioural Therapy Skills in Children who have sustained an
Acquired Brain Injury

My name is Jessica Ingham and I am a Trainee Clinical Psychologist based at the University of East Anglia (UEA). My research supervisors are Dr. Anna Adlam, Clinical Psychologist and Dr. Sian Coker, Clinical Psychologist. I am writing to invite your child to take part in a research project. This information sheet is to help you decide if you are happy for your child to participate. Please take time to read it carefully and discuss it with your child. Please feel free to contact me should you require any further information.

What is the purpose of the project?

This project aims to investigate the consequences of an acquired brain injury in children aged 8 to 12 years old. I am specifically interested in young children's ability to identify and make links between thoughts, feelings and behaviours, and whether this is harder for children who have suffered a brain injury. In order to investigate this I am asking children from two groups to complete a range of tasks and puzzles. The groups are healthy school children and children who have sustained an acquired brain injury. It is hoped that the results of the project will help develop psychological treatment for children who have sustained a head injury.

Why has my child been invited to participate?

Your child has been asked to participate as part of the healthy control group; and because they are between the age of 8 and 12 years old and attending Primary School. I have discussed the study with the head teacher and the school are happy for me to carry out this project.

Does my child have to take part?

No your child does not have to take part in this project. If you decide you do not wish your child to participate then this will have no effect upon any part of their education.

What will happen if I decide to give consent for my child to take part?

If you decide that you are happy for your child to take part in the project. I will meet with your child on one occasion at school for approximately 60 minutes. I will ask them to carry out a series of tasks and puzzles. I will make it clear that these are not a school test, and that there is no right or wrong answers, but that I am interested in their ideas. It will be explained to your child that they can stop participating at any time should they wish to.

The tasks consist asking children to sort cards into different categories, and answer questions on short stories. A short measure of general ability and three brief questionnaires on thinking and feelings will also be used. The tasks have been used before in research at UEA with hundreds of children. Feedback so far is that children find the experience engaging and enjoyable. In the very unlikely event that your child becomes distressed in any way whilst participating I will stop the session immediately and notify their class teacher. In this situation I would also inform my primary research supervisor about the situation; however no personal details will be shared.

I will also one parent to fill out three brief questionnaires on your child and provide some basic demographic information. This should take no more than 25 minutes of your time and I will send these to you via your child's school and ask you to return them using a stamped addressed envelope

What do I have to do if I am happy for my child to take part?

As your child is under 16, before I can include them in the project I need you to provide written parental consent. If you are happy for them to participate then please complete and sign the attached consent form and send this back to your child's school in the envelope provided. I will also ask your child if they are happy to take part and they will sign a form to give their agreement. Even after receiving your consent if your child decides they do not want to take part then they will not be included. Only after receiving consent from you, and assent from your child will I include them in the study. If you are not happy for your child to participate then you need not do anything else.

Are there any expenses or payment involved in the study?

Your child involvement in the study will not involve any financial expense on your part. All correspondence that needs to be returned to me will be sent with a stamped addressed envelope. As a thank you for taking part at the end of the study all children will be entered in to a prize draw to win one of two £10 vouchers for a high street store of their choice.

What are the disadvantages and risks of my child taking part?

I do not think there are any significant disadvantages or risks of taking part. I will carry out the project at school and when arranging to see your child I will try to ensure that I fit in with their school day so that participating in the project causes minimal disruption. If you would prefer you can contact me on the details below and I can arrange to visit your child at home to complete the study.

What are the possible benefits of my child taking part?

There is little direct benefit for your child or yourself from taking part. However, the information we get from this study will help improve psychological treatment for children who have experienced an acquired brain injury.

Will information be kept confidentially?

I will keep all information private and safe. Data will be kept in a locked cabinet and files on computers will be password protected. No identifying information (such as names) will be included on the data and numbers will be used instead. Participation will be audio recorded and a small random sample of recordings listened to by Dr

Anna Adlam. This is to ensure that I carry out the research properly. All recordings will be securely destroyed once this procedure has taken place.

Who has reviewed the study?

All research in the NHS and at the University of East Anglia is looked at by an independent group of people called a Research Ethics Committee, to protect your interests. This study has been reviewed and given a favourable opinion by Cambridge Central Research Ethics Committee.

Thank you for taking the time to read this information sheet. I hope you will decide to allow your child to participate. Should you have any questions I would be very happy to discuss my project further with you and can be contacted on 07976 423 994 or email me on J.Ingham@uea.ac.uk. Should you be unhappy with any aspect of this study or wish to speak to one of my supervisors then they are contactable on 01603 593310.

Many Thanks, Jessica Ingham.

Appendix B

Recruitment letter from service

TRUST LOGO HERE

TRUST ADDRESS

Dear parent,

I am writing to provide you with some information about a research study that we, at the **[insert service]**, are conducting. I am contacting you as your child was previously a patient in our service.

The study, “Cognitive Behaviour Therapy Skills in Children who have sustained an Acquired Brain Injury” is being conducted by a trainee clinical psychologist, Jessica Ingham, who is studying at the University of East Anglia. This project aims to investigate the consequences of acquired brain injury in children aged 8 to 12 years old. We are specifically interested in young children’s ability to identify and make links between thoughts, feelings and behaviours, and whether this is harder for children who have suffered a brain injury. In order to investigate this we are asking children to complete a range of tasks and puzzles. It is hoped that the results of the project will help develop psychological treatment for children who have sustained a head injury.

I have enclosed a copy of the study information sheet providing further information.

If you would like to find out more about the study, then please complete the enclosed consent to share contact details form and return to **[clinician name]** in the SAE provided. Alternatively, you can contact Jessica Ingham directly (telephone: 07976 423994; email: J.Ingham@uea.ac.uk). None of your details will be shared without your consent.

I would like to take this opportunity to remind you that your decision to participate in this research is voluntary and will not affect the clinical care that you receive from members of the **[service name]** team.

Thank you for taking time to consider this request.

With best wishes,

Dr **[Clinician Name and title]**

Appendix C

Consent forms

This appendix section contains the consent to share contact details form for the ABI group, the consent forms for the ABI and comparison groups, the child's assent form, and a head teacher consent form allowing parents to be contacted. Where necessary, the appropriate trust logo for each site was included.

Consent to Share Details
Cognitive Behavioural Therapy Skills in Children who have sustained an
Acquired Brain Injury

Please initial the boxes

1. I.....(parents name) I have been given a participant information sheet dated..... about the above study

☐

2. I give consent for Jessica Ingham, Trainee Clinical Psychologist at the University of East Anglia to contact me about this study. I understand that she will contact me to discuss involvement and answer any questions I may have.

☐

3. I understand that by giving my consent to be contacted neither I or my child are under any obligation to participate.

☐

Name:..... **Signature:**.....

Date:.....

Address:.....
.....
.....
.....

Telephone number.....

Email Address.....

Preferred time to be contacted.....

Thank you for your help.

Jessica Ingham, Trainee Clinical Psychologist.

Email: J.Ingham@uea.ac.uk Phone: 07976 423 994

**Parental consent form for Acquired Brain Injury Group
Cognitive Behavioural Therapy Skills in Children who have sustained an
Acquired
Brain Injury**

Please initial the boxes

1. I confirm that I have read the information sheet dated.....
for the above study. I have the opportunity to consider the information, ask
questions and have had these answered satisfactorily. ☐
2. I understand that my child's participation is voluntary. That they and I are
free to withdraw involvement at any time, without giving any reason, without
the current or future services they receive being affected. ☐
3. I understand that all data collected will remain anonymous and confidential.
That the appointment will be audio recorded and that this will be stored securely
and destroyed at the end of the study. ☐
4. I give consent for Jessica Ingham (Chief Investigator) to access my child's
medical records only to find out the severity of my child's brain injury if I do
not know this information. I understand that this is the only information that will
be accessed. If I am able to provide this information then I understand my child's
medical records will not be looked at. ☐
5. Some measures used in this study are also used in routine clinical practice.
Please initial if you would you be happy for relevant data to be shared between
the clinical team working with your child at.....
(Insert name of rehab centre) and Jessica Ingham. If no clinical service involved
with the child then leave blank. ☐
6. I agree that I am happy for my child to take part in the above study ☐
7. Would you like to receive a written summary of the general findings of the study
on completion of the research? Please delete as applicable -- **YES/NO**
8. I agree for my contact details and my child's date of birth, sex, and nature/date of
injury to be included on a secure Volunteer Research Participant Register, hosted
by the UEA and Dr Anna Adlam, so that I can be contacted about future research
studies conducted by Dr Anna Adlam's research team. Please delete as applicable
–**YES/NO**

_____	_____	
Name of Child	Date of Birth	
_____	_____	_____
Name of Parent	Date	Signature
_____	_____	_____
Name of person taking consent	Date	Signature

Thank you very much for your help.

Jessica Ingham, Trainee Clinical Psychologist
Phone: 07976 423994

Email: J.Ingham@uea.ac.uk

Parental Consent form for School Group
Cognitive Behavioural Therapy Skills in Children who have Sustained an
Acquired Brain
Injury

Please initial the boxes

1. I confirm that I have read the information sheet dated..... for the above study. I have the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my child's participation is voluntary. That they and I are free to withdraw involvement at any time, without giving any reason, without their educational services being affected. ☐
3. I understand that all data collected will remain anonymous and confidential and that the appointment will be audio recorded, that this will be stored securely and destroyed at the end of the study. ☐
4. I agree that I am happy for my child to take part in the above study ☐
5. Would you like to receive a written summary of the findings on completion of the research? Please delete as applicable -- **YES/NO**
6. Has your child ever experienced a brain injury requiring hospital admission? Please delete as applicable -- **YES/NO**

Name of Child

Childs Date of Birth

Name of Parent

Date

Signature

Telephone number or email address:

Preferred time to be contacted:

Please could you return this form to your child's school. When I receive the form I will arrange to visit your child either at home or at school. I will also send four short questionnaires for you to complete.

Thank you very much for your help.

Assent form

I have met Jessica and she has talked to me about some games and puzzles that we are going to do together

I am happy to do these games and puzzles with Jessica and understand that Jessica will not tell anyone my results

Jessica has explained that if I decide I don't want to carry on with the games and puzzles at any time then we will stop.

Name:.....

Age:.....

Thank you very much



Consent form for Head Teachers
Cognitive Behavioural Therapy Skills in Children who have sustained an
Acquired Brain Injury

I..... head teacher of.....

* have read the letter dated..... sent to me by Jessica Ingham, Trainee Clinical Psychologist about the research study entitled ‘Cognitive Behavioural Therapy Skills in Children who have survived a Traumatic Brain Injury’
(Please Initial)

* **give consent/do not give consent** (please delete as applicable) for the children of this school to participate in the research proposed by Jessica Ingham, Trainee Clinical Psychologist at the University of East Anglia. (Please Initial)

* understand that the parents of potential participants will be contacted via the school and sent an information and consent sheet about the study. Parents will be asked to return a signed consent form if they are happy for their child to participate. I understand that no child will participate in the study without written parental consent. (Please Initial)

* understand that the data collected will solely be used for this research project, and that the name of the school, or the name of the children will not be identified.
(Please Initial)

Signature:.....

Date.....

Many Thanks, Jessica Ingham
Trainee Clinical Psychologist.

Email: J.Ingham@uea.ac.uk
Phone: 07976 423 994

Appendix D

Media advert



Version 2 – 27.06.2013

Cognitive Behavioural Therapy Skills in Children who have sustained an Acquired Brain Injury

This study is currently recruiting participants

Sponsor: University of East Anglia, Norwich

Researcher: Jessica Ingham

Research Supervisor: Dr Sian Coker

Purpose

Mental health difficulties (such as anxiety and depression) are relatively common after acquired brain injury in children. With children who do not have a brain injury a form of therapy known as cognitive behavioural therapy can be helpful in treating these disorders. At present little is known about whether children who have suffered a brain injury can effectively make use of this therapy.

The purpose of this study is to evaluate whether children who have suffered from a brain injury (and a comparison group of typically developing children) are able to demonstrate skills that would suggest they are able to participate in Cognitive Behavioural Therapy. This would be assessed by asking the children to complete a range of interactive puzzles and tasks. The assessment would be completed over a single session lasting 60-75 minutes in the participant's home.

Inclusion Criteria:

- **Aged 8 to 12 years old**
- Has an acquired brain injury (including moderate to severe TBI) and is medically stable enough to participate in research.
- English Speaking and able to read basic English

Exclusion Criteria for children who have had an Acquired Brain Injury:

- Pre-injury diagnosis of intellectual disability
- Mild Traumatic Brain Injury

If you are interested in having your child participate in our study, or if you have any questions, please contact the research coordinator, Jessica Ingham by any of the following means and we will respond to you as soon as we can:

Email: J.Ingham@uea.ac.uk

Telephone: 07976 423 994

Post: University of East Anglia, School of Medicine, Health Policy & Practice,
Elizabeth Fry Building, University of East Anglia, Norwich, NR4 7TJ

Many Thanks.

Appendix E

Letter to head teacher

Letter to Head Teacher

Cognitive Behavioural Therapy Skills in Children who have sustained an Acquired Brain Injury

Dear [insert name],

I am a second year Trainee Clinical Psychologist studying on the Doctoral Programme in Clinical Psychology at the University of East Anglia. I am writing to enquire about whether you would be willing to help me with a piece of research I am carrying out under the supervision of Dr. Anna Adlam, Clinical Psychologist and Dr. Sian Coker, Clinical Psychologist.

As part of my course I am required to undertake a piece of research in an area of my interest. I would like to carry out a piece of research looking at young children's ability to identify and make links between thoughts, feelings and behaviours. I am interested in finding out whether children who have suffered from a significant head injury are impaired at this when compared to normally developing children. It is hoped that increasing our knowledge about the emotional and psychological consequences of head injury in children will assist clinicians to more effectively be of help when working with these children.

The study consists of asking children aged between 8 and 12 years old to complete a variety of tasks, including sorting sentences in to different categories and answering questions on short stories. Children will also be asked to complete a short measure of general ability. The tasks will last for approximately 60 minutes, and will be carried out at the child's home. Children will be informed that if at any point they do not wish to continue then they are able to stop. It is not expected that these tasks will be in any way distressing for the children, in fact they have been carried out for research purposes with hundreds of children, and the feedback is that children find the tasks engaging and enjoyable. Additionally a parent of the participating child will also be asked to fill out three brief questionnaires and provide some demographic information.

The interviews will be recorded and a small random sample from the whole project listened to, in private, by Dr Anna Adlam. This process is solely to ensure that I have carried out and marked the children's responses to the tasks appropriately. All recordings will be destroyed once this procedure has been taken place and nowhere on the tape will the child or school be identifiable.

When the project is written up neither the child or schools name will be included in the study, and children will be identified by number only on any written records. The data gathered will be used solely for the purpose of this project and will be treated

with the strictest of confidence and stored securely. The study has been granted ethical approval from Cambridge Central Ethics Research Committee.

Parents will be provided with information sheets and consent forms (which I have enclosed for you to see). Parents will be asked to return these to school if they and their child are happy to participate. Children will only be able to participate with signed consent from a parent. Children will also be asked to give their assent to participate, which will be documented and no child will be asked to take part unless they are willing.

I am very grateful for your assistance and will treat the school, children and teachers with the upmost respect at all times. I aim to conduct the research with the minimum disruption to your school as possible. Additionally, should you think it would be useful I would be more than willing to come and discuss my research with members of your staff team, or introduce myself to your pupils. Once the research is completed, I would also be happy to feedback the main research findings and their implications to yourself and your staff team.

I aim to follow this letter up with a phone call over the next week to discuss my project and answer any questions you may have. If you are happy to allow your pupils to participate in this study then I will arrange to visit the school to discuss this further and gain written consent from yourself.

If, in the mean time you have any questions or concerns I would be very happy to discuss these with you. I can be contacted on 07976 423 994 or on J.Ingham@uea.ac.uk. Should you wish to contact either of my supervisors then they can be reached at the University of East Anglia on the above telephone number.

Yours Sincerely

Jessica Ingham
Trainee Clinical Psychologist
Doctorate Course in Clinical Psychology
Norwich Medical School
University of East Anglia
Norwich
Norfolk
NR4 7TJ

Appendix F

CST stories and procedural instructions

Procedural instructions for the CST from Quakley et al. (2004)

I am going to read you some stories about a girl called Mary (or a boy called Harry, for boys). In each of the stories you will find something out that Mary has been doing, something that Mary has been thinking, something that Mary has been feeling. When I have finished reading the story I will read you three different cards one by one, which each have different parts of the story on them. I would like you to tell me which card is about something that Mary was doing 'a doing part' which card is about something that Mary was feeling, 'a feeling part' and which card is about something that Mary was thinking, 'a thinking part'.

Say: 'let me show you'

Demonstration story (*Behaviour-feeling-thought, positive*) (not scored)

Read demonstration story to child: Mary cleaned her teeth before bedtime. Mary was very happy because the next day she was going on holiday. Mary wondered if there might be a bouncy castle.

Say: 'now I am going to read three cards to remind us of what happened in the story'.

Read card 1, a 'doing sentence' card: 'Mary cleaned her teeth'

Say: 'Now, 'Mary cleaned her teeth', was something that Mary was doing so this is a 'doing' part of the story'.

Read card 2, a 'feeling sentence' card: 'Mary was very happy'

Say: 'Now, 'Mary was very happy' was something that Mary was feeling, so this is a 'feeling' part of the story.'

Read Card 3, a 'thinking sentence card': 'There might be a bouncy castle on holiday'

Say: 'Now, 'there might be a bouncy castle on holiday', was something which Mary was thinking, so this is a 'thinking part of the story'.

Say: 'Now i would like you to try'.

Sample Story (*Thought-behaviour-feeling, positive*) (not scored)

Read sample story to child: 'Mary knew that it was her friend Emma's birthday next week. Mary bought Emma some chocolate for a present. Mary was happy that she had bought her friend a present'.

Say: 'Now i am going to read you three cards to remind you of what happened in the story. I would like you to tell me which card tells you something which Mary was doing, 'a doing part', which card tells you something which Mary was feeling, 'a

feeling part', and which card tells you something which Mary was thinking 'a thinking part'

Read card 1, a 'feeling sentence card': 'Mary was Happy'.

Say: 'Now. Is this something which Mary was doing, 'a doing part', or is it something that Mary was feeling 'a feeling part', or is it something which Mary was thinking, 'a thinking part?'.

Note the child's response. If the child answers correctly praise the child and move on to the next item.

Say: Very good, let's try another'.

Read card 2, 'a doing sentence card': Mary bought her friend some chocolate'

Say: 'Now. Is this something which Mary was doing, 'a doing part', or is it something that Mary was feeling 'a feeling part', or is it something which Mary was thinking, 'a thinking part?'.

Note the child's response. If the child answers correctly praise the child and move on to the next item.

Say: 'Very good, let's try another'.

Read card 3, a 'thinking sentence card': 'It's Emma's Birthday next week'

Say: 'Now. Is this something which Mary was doing, 'a doing part', or is it something that Mary was feeling 'a feeling part', or is it something which Mary was thinking, 'a thinking part?'.

Note the child's response.

If all items are correct proceed with main task.

Say: 'Well done I am going to tell you some more stories about Mary now and ask you some more questions about the stories'

If a child gets any of the items on the sample story incorrect, correct the child by saying for example:

Say: 'good try, 'but Mary bought her friend some chocolate' is something which Mary was doing, so it is a doing part of the story'.

After an incorrect response proceed with the other items until all three cards have been read out.

At the end of the task repeat incorrect items. Continue to correct the child until the child has got each item correct. When all items have been sorted correctly proceed with the main task.

Say: 'well done, I'm going to tell you some more stories about Mary now and ask you some more questions about the stories.

Proceed with the main task

Read each story out to the child. For each story randomly the order in which the three 'thought, feeling and doing' test cards are read out to a child by drawing them blind from an envelope. Note child's responses, but do not correct incorrect items.

After reading out each test card, say:

Say: 'Now. Is this something which Mary was doing, 'a doing part', or is it something that Mary was feeling 'a feeling part', or is it something which Mary was thinking, 'a thinking part?'

After each response from the child say:

Say: 'good, let's try another'

After each story say:

Say: Well done, I'm going to tell you another story about Mary now, and ask you some more questions about the story.

Stimuli for the CST task from Quakley et al. (2004)

The character is called Mary for girls and Harry for boys.

Demonstration story (*Behaviour-feeling-thought, positive*) (*not scored*)

Mary cleaned her teeth before bedtime. Mary was very happy because the next day she was going on holiday. Mary wondered if there might be a bouncy castle.

Sample Story (*Thought-behaviour-feeling, positive*) (*not scored*)

Mary knew that it was her friend Emma's birthday next week. Mary bought Emma some chocolate for a present. Mary was happy that she had bought her friend a present.

Item 1 (*Feeling-thought-behaviour, positive*) (*scored*)

Christmas was coming and Mary was very excited. Mary wished that Father Christmas would bring her a new puppy. Mary made a home for the puppy with a blanket and a cardboard box.

Item 2 (*Feeling-behaviour-thought, negative*) (*scored*)

Last week at school Mary was very upset. Mary ran into the school cloakroom to hide from everybody. Mary wondered if anyone would come to find her.

Item 3 (*Behaviour-thought-feeling, negative*) (*scored*)

It was home time from school and no bus there to pick Mary up. Mary walked into the playground to find her mum. Could it be that her mum had forgotten to come to the school? Mary was very worried.

Item 4 (*Behaviour-feeling-thought, positive*) (*scored*)

Mary went shopping with her mum on Sunday. Mary was very pleased with her new hat. Mary hoped that her new hat would match her scarf.

Item 5 (*Thought-feeling-behaviour, negative*) (*scored*)

Last night there was a loud thunderstorm. The thunder sounded a bit like fireworks to Mary. Mary was very frightened. Mary hid under the table.

Item 6 (*Thought-behaviour-feeling, positive*) (*scored*)

It was teatime on Tuesday. Mary wondered what her mum was cooking. Mary shouted into the kitchen to find out. Mary was very happy to hear she had chips which were her favourite.

Appendix G

Thought to feeling and thought to behaviour linking tasks

This appendix section contains examples of the visual stimuli used for the thought to feeling and thought to behaviour linking tasks, along with the procedural and scoring instructions.

Thought to Feeling:



Thought to behaviour:



Procedural instructions and stories for the ‘Thought to Feeling Story Card Linking Task’.

Say: ‘I am going to tell you some short stories about some different children. I am also going to ask you some questions about different things that happen to the children in the stories. There are no right or wrong answers; I am just interested in why you think certain things may have happened in the stories’

Place the cards one at a time on the table in the sequence depicted in the picture card presentations which follow the written instructions. Read the corresponding part of the story to the child.

Item 1:

Place picture 1 on the table: Picture of Sally.

Say: ‘This is Sally’.

Place picture 2 on the table: Picture of Sally’s rabbit in a hutch

Say: ‘this is Sally’s rabbit living in his hutch.

Place picture 3 on the table: Picture of Sally playing with her rabbit.

Say: ‘One day Sally was playing with her Rabbit’.

Place picture 4 on the table: Picture of Spotty dog chasing Sally’s Rabbit away.

Say: ‘When a spotty dog chased Sally’s rabbit away’.

Place picture 5 on the table: Picture of Sally looking sad.

Say: ‘Sally was very sad’

Say: ‘Why did Sally feel sad?’

Control question to help remember and check memory – not scored.

Place picture 6 on the table: Picture of Sally playing with her friend James.

Say: ‘Many days later Sally was playing with her friend James’.

Place picture 7 on the table: Picture of a photograph of Sally’s rabbit.

Say: ‘When Sally saw a photograph of her Rabbit’.

Place picture 8 on the table: Picture of Sally looking sad.

Say: ‘Sally was very sad’.

Say: Why did Sally start to feel Sad right now.

To help elicit and encourage explanations paraphrase the child’s answers back to them and encourage them to guess.

Thought to feeling stories – full set

1. T to F, Sad, Female

Put picture 1 down

Say: this is Sally

Put picture 2 down

Say: This is Sally's rabbit living in his cage

Put picture 3 down

Say: one day Sally was playing with her Rabbit

Put picture 4 down

Say: When a spotty dog chased Sally's rabbit away

Put picture 5 down

Say: Sally was very sad

Say: Why was Sally sad?

Put picture 6 down

Say: Many days later, Sally was playing with her friend James'

Put picture 7 down

Say: When Sally saw a photograph of her Rabbit

Put Picture 8 down

Say: Sally was very sad

Say: Why did Sally start to feel sad right now?

2. T to F, Sad, Male

Put picture 1 down

Say: This is Adam

Put picture 2 down

Say: This is Adams new bicycle and bicycle helmet

Put picture 3 down

Say: One day Adam rode over a hole in the road and fell off of his bicycle

Put picture 4 down

Say: Adams bicycle was broken and had to be thrown away

Put picture 5 down

Say: Adam was very sad

Say: Why did Adam feel sad?

Put picture 6 down

Say: Many days later, Adam was playing with his friend Annie

Put picture 7 down

Say: When Adam noticed his bicycle helmet

Put Picture 8 down

Say: Adam was very sad

Say: Why did Adam start to feel sad right now?

3. T to F, Happy, Female

Put picture 1 down

Say: This is Emily

Put picture 2 down

Say: It was school sports day at Emily's school. This is the running track for all the races

Put picture 3 down

Say: Emily in a race on school sports day

Put picture 4 down

Say: Emily won the race and got a medal

Put picture 5 down

Say: Emily was very happy

Say: Why was Emily very happy?

Put picture 6 down

Say: Many days later, Emily was playing with her friend Luke

Put picture 7 down

Say: When Emily noticed a photograph of her at school sports day running in the race

Put Picture 8 down

Say: Emily was very happy

Say: Why did Emily start to feel happy right now?

4. T to F, Happy, Male

Put picture 1 down

Say: This is William

Put picture 2 down

Say: This is William in his classroom with some glue and paper

Put picture 3 down

Say: All the children had to make a paper aeroplane with some paper and glue

Put picture 4 down

Say: William's aeroplane was the best in the class and William got a sticker from his teacher

Put picture 5 down

Say: William was very happy

Say: Why was William very happy?

Put picture 6 down

Say: Many days later, William was playing with his friend Jane

Put picture 7 down

Say: When William noticed his paper aeroplane on a table

Put Picture 8 down

Say: William was very happy

Say: Why did William feel happy right now?

Procedural instructions and stories for the ‘Thought to Behaviour Story Card Linking Task’.

Say: ‘I am going to tell you some short stories about some different children. I am also going to ask you some questions about different things that happen to the children in the stories. There are no right or wrong answers; I am just interested in why you think certain things may have happened in the stories’

Place the cards one at a time on the table in the sequence depicted in the picture card presentations which follow the written instructions. Read the corresponding part of the story to the child.

Example: Item 1:

Place picture 1 on the table: Picture of Ben.

Say: ‘This is Ben’.

Place picture 2 on the table: Picture of Ben in his school playground

Say: ‘this is Ben’s playground in his new school’

Place picture 3 on the table: Picture of Ben playing in his school playground

Say: ‘One day Ben was playing in his new playground’.

Place picture 4 on the table: Picture of Ben being called names by some big boys.

Say: ‘When some big boys in red coats came over and called Ben names’.

Place picture 5 on the table: Picture of Ben Running away.

Say: ‘Ben Ran away to hide’

Say: ‘Why did Ben run away to hide?’

Control question to help remember and check memory – not scored.

Place picture 6 on the table: Picture of Ben playing with his friend Clare.

Say: ‘Many days later Ben was playing with his friend Clare’.

Place picture 7 on the table: Picture of the big boys

Say: ‘When Ben saw the big boys in red coats’

Place picture 8 on the table: Picture of Ben running away.

Say: ‘Ben ran away to hide

Say: Why did Ben run away to hide right now.

To help elicit and encourage explanations paraphrase the child’s answers back to them and encourage them to guess.

Thought to Behaviour stories – Full set

1. T to B, Sad, Male

Put picture 1 down

Say: This is Ben

Put picture 2 down

Say: This is Ben's playground in his new school

Put picture 3 down

Say: One day Ben was playing in his new playground

Put picture 4 down

Say: When some big boys in red coats came over and called Ben names

Put picture 5 down

Say: Ben ran away to hide

Say: Why did Ben run away to hide?

Put picture 6 down

Say: Many days later, Ben was playing with his friend Clare

Put picture 7 down

Say: When Ben saw the big boys in red coats

Put Picture 8 down

Say: Ben Ran away to hide

Say: Why did Ben run away to hide right n

2. T to B, Sad, Female

Put picture 1 down

Say: This is Wendy

Put picture 2 down

Say: These are Wendy's new lace up shoes which have long red shoe laces

Put picture 3 down

Say: One day Wendy was at school when her shoe laces came undone but she couldn't tie them up

Put picture 4 down

Say: Many children laughed at Wendy because she couldn't tie her laces

Put picture 5 down

Say: Wendy ran away to try and practice tying her shoe laces alone

Say: Why did Wendy run away to practice tying her shoe laces alone?

Put picture 6 down

Say: Many days later, Wendy was playing with her friend Steven

Put picture 7 down

Say: When she noticed her new shoes, with long red laces, in a cupboard

Put Picture 8 down

Say: Just then Wendy went away on her own, to practice tying her shoe laces

Say: Why did Wendy go away on her own to practice tying her shoe laces right now?

3. T to B, Happy, Female

Put picture 1 down

Say: This is Laura

Put picture 2 down

Say: This is Laura's mum and dad looking through a Disneyland holiday book

Put picture 3 down

Say: One night Laura and her mum and dad sat down and watched a Disney video

Put picture 4 down

Say: When Laura's mum and dad told her they were going to take her on holiday to Disneyland and they showed her the pictures in the Disneyland holiday book

Put picture 5 down

Say: Laura jumped up and down

Say: Why did Laura jump up and down?

Put picture 6 down

Say: Many days later, Laura was playing with her friend Tom

Put picture 7 down

Say: When she found the holiday book about Disneyland

Put Picture 8 down

Say: Laura jumped up and down

Say: Why did Laura jump up and down right now?

4. T to B, Happy, Male

Put picture 1 down

Say: This is Peter

Put picture 2 down

Say: This is Peter's best friend Nicola, with her favourite Teddy

Put picture 3 down

Say: Peter's friend Nicola had to move a long way away and change school, so Peter didn't get to see her very often

Put picture 4 down

Say: One day Peter gets a letter from Nicola to say that she will come to visit soon, because she left her teddy behind last time that she came to stay

Put picture 5 down

Say: Peter ran over to look at the window

Say: Why did Peter run over to look out of the window

Put picture 6 down

Say: Many days later, Peter was playing with his sister

Put picture 7 down

Say: When he notices Nicolas letter on the kitchen table

Put Picture 8 down

Say: Peter ran over to look out of the window

Say: Why did Peter run over to look out of the window right now?

1. Scoring Criteria For the 'Thought to Feeling Story Card Linking Task'.

Three main elements score points for children's responses to the stories; mention of 'the cue', mention of 'a thought' and mention of the 'past event'. Each element gains a score of 4 points if mentioned spontaneously following the first question apart from if the child mentions the 'past event' only (which can only receive a score of between 1 and 3 points). Children do not score 4 points if they mention the past event only, because they have not been able to indicate spontaneously that the characters current emotion is closely linked to something occurring in the current situation.

Higher scores indicate more advanced answers. The maximum score for each story is 12 points. There are five response categories for the 'Thought to Feeling Story Card Linking Task'. For each of the scoring categories further points may be gained through cueing questions. Children are awarded fewer points for answers following cueing questions, in comparison to spontaneous answers. In the following scoring criteria, specific examples of all categories of answers are given for Item 1 of the 'Thought to Feeling Story Card Linking Task', which is shown here as a reminder, and specific examples of the most complex answers (Category Five, Cognitive Cueing Responses) are given for all stories.

ITEM NUMBER ONE 'THE LOST RABBIT':

Picture 1: Picture of Sally.

Say: 'This is Sally'.

Picture 2: Picture of Sally's rabbit in a cage.

Say: 'This is Sally's rabbit living in his cage'.

Picture 3: Picture of Sally playing with her rabbit.

Say: 'One day Sally was playing with her rabbit'.

Picture 4: Picture of a spotty dog chasing Sally's rabbit away.

Say: 'When a spotty dog chased Sally's rabbit away'.

Picture 5: Picture of Sally looking sad.

Say: 'Sally was very sad'.

Say: Why did Sally feel sad?

(This is a control question to help the child to remember the events of the story and is not marked).

Picture 6: Picture of Sally playing with James.

Say: 'Many days later, Sally was playing with her friend James'.

Picture 7: Picture of a photograph of Sally's rabbit.

Say: 'When Sally saw a photograph of her rabbit'.

Picture 8: Picture of Sally looking sad.

Say: 'Sally was very sad'.

Question: 'Why did Sally start to feel sad right now?'

CATEGORY NUMBER ONE: SITUATIONAL RESPONSES:

The child's response is unrelated to the events of the story.

AN EXAMPLE OF A SITUATIONAL RESPONSE: 'She was sad because she wanted her tea and it wasn't there'.

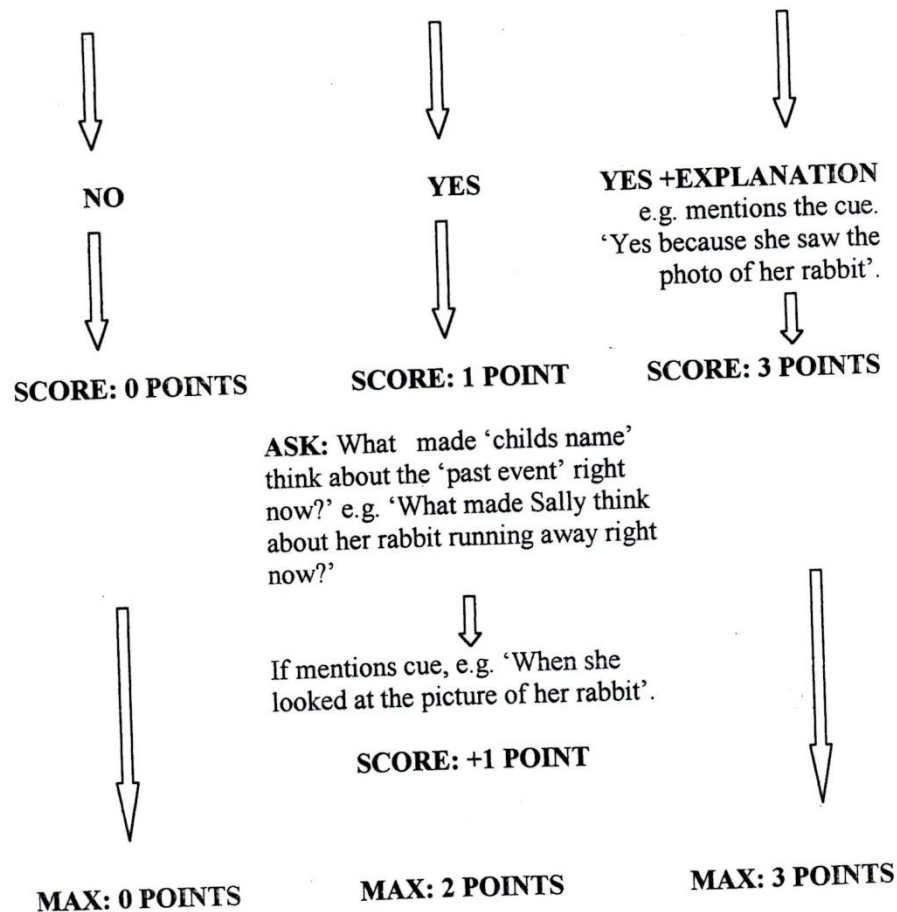
SCORE: 0 POINTS.

CATEGORY NUMBER TWO: PAST EVENT RESPONSES:

The child responds by mentioning the past event. This demonstrates a memory of the past event even if the 'memory' or 'thought' of the past event is not explicitly mentioned.

AN EXAMPLE OF A PAST EVENT RESPONSE: 'Because the rabbit ran away'.

ASK: 'Is 'child's name' thinking about the 'past event' right now?' e.g. 'Is Sally thinking about her rabbit running away right now?'



CATEGORY NUMBER THREE: CUE RESPONSES:

The child responds by mentioning the cue. This demonstrates an understanding that recognition of an object, which was previously related to an emotional event, can elicit an emotional response in the 'here and now'. The child does not however explicitly mention 'thinking'. Extra points can be scored for mentioning the 'past event' in the first instance or by mentioning the 'past event' or 'thinking' following cueing questions.

EXAMPLES OF CUE RESPONSES:

1. The child mentions the cue only (not 'thinking' and not the 'past event').
e.g. 'Because she saw the photo.'

SCORE: 4 POINTS



ASK: Why did seeing 'the cue' make 'child's name feel 'emotion'? e.g. 'Why did seeing the photo make Sally feel sad?'



+2 points mentions thinking e.g.
'Because it made her remember the rabbit'

+2 points mentions past event e.g.
'Because her rabbit got chased away'

MAXIMUM = 8 POINTS

2. The child mentions the cue and the past event but not 'thinking'.
e.g. 'She saw the photo and the rabbit had been chased away'.

SCORE: 8 POINTS



+2 points mentions thinking e.g.
'Because it made her remember the rabbit'.

MAXIMUM = 10 POINTS

CATEGORY NUMBER FOUR: THINKING RESPONSES:

The child responds by mentioning the characters 'thoughts'. This demonstrates an understanding that an object, which was previously related to an emotional event, can elicit a cognition / thought in the 'here and now'. The child does not however explicitly mention 'the cue'. Extra points can be scored for mentioning the 'past event' in the first instance or by mentioning the 'past event' or 'the cue' following cueing questions.

EXAMPLES OF THINKING RESPONSES:

1. The child mentions 'thinking' only not the 'cue' and not the 'past event').
e.g. 'Because she was reminded of her rabbit.'

SCORE: 4 POINTS



ASK: What made 'child's name' think about that right now?
e.g. 'What made Sally think about that right now?'



+2 points mentions 'the cue' e.g.
'Because she saw the photo'

+2 points mentions past event e.g.
'and her rabbit got chased away'

MAXIMUM = 8 POINTS

2. The child mentions thinking and the past event but not 'the cue'.
e.g. 'She was thinking about her rabbit that was chased away'.

SCORE: 8 POINTS



ASK: What made 'child's name' think about that right now?
e.g. 'What made Sally think about that right now?'



+2 points mentions 'the cue' e.g.
'Because of the rabbit photo'

MAXIMUM = 10 POINTS

CATEGORY NUMBER FIVE: COGNITIVE CUEING RESPONSES:

These are the most complex types of response in which the child spontaneously mentions all three elements of the story required for a top score (4 points for each part) 'the cue', 'a thought' and the 'past event'. This type of response clearly demonstrates that an object in the present can trigger a thought or memory of a past event, which influences current emotion.

EXAMPLE OF A COGNITIVE CUEING RESPONSE:

'When Mary saw the photo it made her think about the time when her rabbit got chased by a spotty dog.'

SCORE: 12 POINTS.

EXAMPLES OF 12 POINT COGNITIVE CUEING RESPONSES FOR STORIES 2-4.

STORY NUMBER 2: 'THE BROKEN BICYCLE'.

'The helmet was there and it made him think about when he fell off his bike and it broke'.

STORY NUMBER 3: 'SCHOOL SPORTS DAY'.

'In the race she won a medal and that photo is of the race and it reminded her of winning'.

STORY NUMBER 4: 'THE PAPER AEROPLANE'.

'When he saw the paper aeroplane he thought about the time when he got a sticker for making it, because it was a really good one'.

1. Scoring Criteria For the 'Thought to Behaviour Story Card Linking Task'.

Three main elements score points for children's responses to the stories; mention of 'the cue', mention of 'a thought' and mention of the 'past event'. Each element gains a score of 4 points if mentioned spontaneously following the first question apart from if the child mentions the 'past event' only (which can only receive a score of between 1 and 3 points). Children do not score 4 points if they mention the past event only, because they have not been able to indicate spontaneously that the characters current behaviour is closely linked to something occurring in the current situation.

Higher scores indicate more advanced answers. The maximum score for each story is 12 points. There are five response categories for the 'Thought to Behaviour Story Card Linking Task'. For each of the scoring categories further points may be gained through cueing questions. Children are awarded fewer points for answers following cueing questions, in comparison to spontaneous answers. In the following scoring criteria, specific examples of all categories of answers are given for Item 1 of the 'Thought to Behaviour Story Card Linking Task', which is shown here as a reminder, and specific examples of the most complex answers (Category Five, Cognitive Cueing Responses) are given for all stories.

ITEM NUMBER ONE 'NAME CALLING':

Picture 1: Picture of Ben.

Say: 'This is Ben'.

Picture 2: Picture of Ben in his school playground.

Say: 'This is Ben's playground in his new school'.

Picture 3: Picture of Ben playing in his new playground.

Say: 'One day Ben was playing in his new playground'.

Picture 4: Picture of Ben being called names by some big boys.

Say: 'When some big boys in red coats came over and called Ben names'.

Picture 5: Picture of Ben running away.

Say: 'Ben ran away to hide'.

Say: 'Why did Ben run away to hide?'

(This is a control question to help the child to remember the events of the story and is not marked).

Picture 6: Picture of Ben playing with his friend Clare.

Say: 'Many days later, Ben was playing with his friend Clare'.

Picture 7: Picture of the big boys.

Say: 'When Ben saw the big boys in red coats'.

Picture 8: Picture of Ben running away.

Say: 'Ben ran away to hide'.

Question: 'Why did Ben run away to hide right now?'

CATEGORY NUMBER ONE: SITUATIONAL RESPONSES:

The child's response is unrelated to the events of the story.

AN EXAMPLE OF A SITUATIONAL RESPONSE: 'He ran away to play football again'.

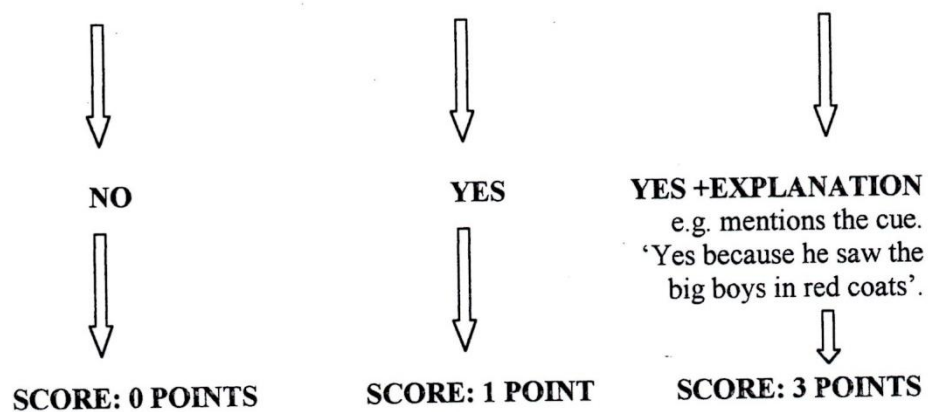
SCORE: 0 POINTS.

CATEGORY NUMBER TWO: PAST EVENT RESPONSES:

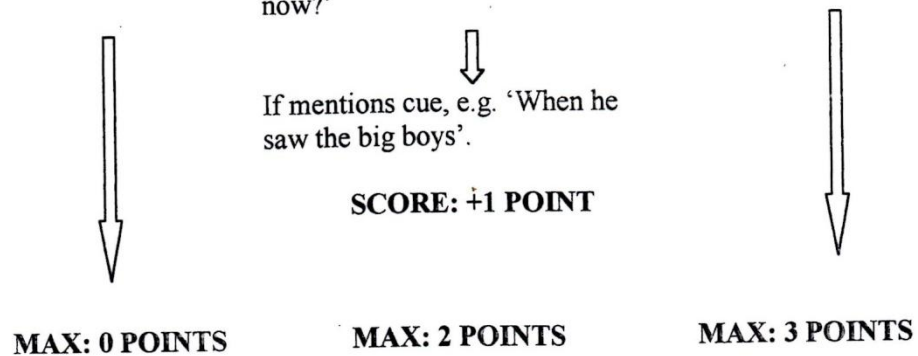
The child responds by mentioning the past event. This demonstrates a memory of the past event even if the 'memory' or 'thought' of the past event is not explicitly mentioned.

AN EXAMPLE OF A PAST EVENT RESPONSE: 'He was called names before'.

ASK: 'Is 'child's name' thinking about the 'past event' right now?' e.g. 'Is Ben thinking about being called names right now?'



ASK: What made 'childs name' think about the 'past event' right now?' e.g. 'What made Ben think about being called names right now?'



CATEGORY NUMBER THREE: CUE RESPONSES:

The child responds by mentioning the cue. This demonstrates an understanding that recognition of an object, which was related to a past event, can elicit a behavioural response in the 'here and now'. The child does not however explicitly mention 'thinking'. Extra points can be scored for mentioning the 'past event' in the first instance or by mentioning the 'past event' or 'thinking' following cueing questions.

EXAMPLES OF CUE RESPONSES:

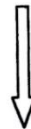
1. The child mentions the cue only (not 'thinking' and not the 'past event').
e.g. 'Because he saw the big boys.'

2. The child mentions the cue and the past event but not 'thinking'.
e.g. 'He saw the big boys who called him names before'.

SCORE: 4 POINTS



ASK: Why did seeing 'the cue' make 'child's name 'perform action'? e.g. 'Why did seeing the big boys make Ben run away?'



+2 points mentions thinking e.g.
'Because he could remember when...'

+2 points mentions past event e.g.
'...they called him names before.'

MAXIMUM = 8 POINTS

SCORE: 8 POINTS



ASK: Why did seeing 'the cue' make 'child's name 'perform action'? e.g. 'Why did seeing the big boys make Ben run away?'



+2 points mentions thinking e.g.
'Because he remembered they called him horrible names'.

MAXIMUM = 10 POINTS

CATEGORY NUMBER FOUR: THINKING RESPONSES:

The child responds by mentioning the characters 'thoughts'. This demonstrates an understanding that an object, which was related to a previous event, can elicit a cognition / thought in the 'here and now'. The child does not however explicitly mention 'the cue'. Extra points can be scored for mentioning the 'past event' in the first instance or by mentioning the 'past event' or 'the cue' following cueing questions.

EXAMPLES OF THINKING RESPONSES:

1. The child mentions 'thinking' only not the 'cue' and not the 'past event').
e.g. 'Because he remembered them'

SCORE: 4 POINTS



ASK: What made 'child's name' think about that right now?
e.g. 'What made Ben think about that right now?'



+2 points mentions 'the cue' e.g.
'Because he saw the big boys'
+2 points mentions past event e.g.
'and they said nasty names to him
last time'

MAXIMUM = 8 POINTS

2. The child mentions 'thinking' and the 'past event' but not 'the cue'.
e.g. 'He was thinking about being called names before'.

SCORE: 8 POINTS



ASK: What made 'child's name' think about that right now?
e.g. 'What made Ben think about that right now?'



+2 points mentions 'the cue' e.g.
'Because the boys in red coats were
there'

MAXIMUM = 10 POINTS

CATEGORY NUMBER FIVE: COGNITIVE CUEING RESPONSES:

These are the most complex types of response in which the child spontaneously mentions all three elements of the story required for a top score (4 points for each part) 'the cue', 'a thought' and the 'past event'. This type of response clearly demonstrates that an object in the present can trigger a thought or memory of a past event, which influences current behaviour.

EXAMPLE OF A COGNITIVE CUEING RESPONSE:

'He ran away because the big boys were there and he remembered they called him names one time'

SCORE: 12 POINTS.

EXAMPLES OF 12 POINT COGNITIVE CUEING RESPONSES FOR STORIES 2-4.

STORY NUMBER 2: 'TYING SHOE LACES'.

'When she looked at the shoes she remembered people laughed at her before so she went to practise doing them up in-case he laughs too'.

STORY NUMBER 3: 'GOING TO DISNEYLAND'.

'Because she's noticed the book and remembers that her mum and dad are going to take her on holiday'.

STORY NUMBER 4: 'LETTER FROM A FRIEND'.

'In the letter it says that his friend is coming to visit so when he saw it again he thought about her and wants to see if she's there yet'.

Appendix H

First order theory of mind task

Cognitive Behavioural Therapy Skills in Children who have survived a Traumatic Brain Injury

First Order Theory of Mind Task

Say: 'I am going to tell you a story about a child called Bobby. I am also going to ask you four questions about different things that happen to the Bobby in the story. There are no right or wrong answers, I am just interested in what you think may have happened in the story'

Say: 'Bobby loves chocolate. Bobby's mum knows that chocolate is Bobby's favourite thing in all the world. He keeps lots of chocolate bars in the cupboard in his bedroom. Bobby's mum doesn't like him eating chocolate. It might spoil his tea! One day when he has gone to his friend's house, Bobby's mum moves the chocolate bars and she puts them into her pink shopping bag'

Memory:

Say: Which one is true?

- a) Bobby went out to a chocolate factory.
- b) Bobby went out to his friend's house.

Theory of mind Level 0:

Say: Which one is true?

- a) Bobby's favourite thing in the world is chocolate.
- b) Bobby's favourite thing in the world is going out with his friends.

Memory:

Say: Which one is true?

- a) Bobby's mum's shopping bag was yellow.
- b) Bobby's mum's shopping bag was pink.

Theory of mind Level 1:

Say: Which one is true?

- a) Bobby thinks his chocolate is in his mum's shopping bag.
- b) Bobby thinks his chocolate is in his cupboard.

Appendix I

Demographic information

Cognitive Behavioural Therapy Skills in Children who have sustained an Acquired Brain Injury

Demographic Information

It would help me to know a little bit of information about who else lives in your household. This information, alongside the other information collected for this study will be kept confidential and anonymous, the names of the other people in your household are not required.

Please fill out the questions below, if you have any questions please do not hesitate to contact me.

1. How many people live in your household?.....

Please fill out a row of this table for each person living in your household.

Participating child refers to the child who I am visiting to complete the tasks with.

	Relationship to participating child e.g. mother, brother etc	Age	Occupation (If over 16 years old)	Nationality
1				
2				
3				
4				
5				
6				
7				
8				

Thank you for taking the time to fill this out.

Jessica Ingham, Trainee Clinical Psychologist.

Email: J.Ingham@uea.ac.uk Phone: 07976 423 994

Appendix J

Information on injury for ABI group

Cognitive Behavioural Therapy Skills in Children who have sustained an Acquired Brain Injury

Information on injury for Acquired Brain Injury group.

It would help me to know a few details about your child's injury. Please fill in the questions below. If you have any questions, please do not hesitate to contact me.

1. What type of injury did your child sustain?

.....

2. When was your child injured? (Date)

.....

3. What was the nature of the injury? (E.g. road traffic accident, fall, infection, stroke etc)

.....

4. If your child was hospitalised due to the injury how long was this for?

.....

5. Do you know whether your Child's brain injury was rated as mild/moderate/severe?

.....

6. Do you remember approximately how long your child suffered from post trauma amnesia for after injury?

.....

7. Do you remember your Child's Glasgow Coma Index Score?

.....

8. Do you remember how long your child lost consciousness for?

.....

Signed:.....

Date:.....

Jessica Ingham, Trainee Clinical Psychologist

Email: J.Ingham@uea.ac.uk Phone: 07976 423 994

Appendix K

Ethical Approval

This appendix section contains the original NHS Ethics approval letter for the study.

Also included are approval letters from three substantial amendments submitted throughout the course of the research, primarily related to enhancing recruitment and meeting the needs of different services.



National Research Ethics Service
NRES Committee East of England - Cambridge Central

Victoria House
Capital Park
Fulbourn
Cambridge
CB21 5XB

Telephone: 01223 597685
Facsimile: 01223 597645

07 November 2011

Miss Amy Carroll
Doctoral Student in Clinical Psychology
Care of Kerensa Rands,
Room 2.30, Elizabeth Fry Building
University of East Anglia, Norwich
NR4 7TJ

Dear Miss Carroll

Study title: Cognitive Behavioural Therapy Skills in Children who
have Survived a Traumatic Brain Injury
REC reference: 11/EE/0328

Thank you for your letter of 17 October 2011, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

The additional two questionnaires were also approved.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

This Research Ethics Committee is an advisory committee to the East of England Strategic Health Authority
The National Research Ethics Service (NRES) represents the NRES Directorate within
the National Patient Safety Agency and Research Ethics Committees in England

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Advertisement	1	29 July 2011
Evidence of insurance or indemnity	Zurich Municipal	28 June 2011
Investigator CV	Amy Carroll	08 July 2011
Other: CV for Anna Adlam		08 July 2011
Other: Assent form	1	29 July 2011
Other: Letter to head teacher	3	18 October 2011
Participant Consent Form: consent to share details form	2	29 July 2011
Participant Consent Form: Traumatic Brain Injury Group	3	18 October 2011
Participant Consent Form: School Group	3	18 October 2011
Participant Consent Form: Orthopaedic Injury Group	3	18 October 2011
Participant Information Sheet: Orthopaedic Injury Group	3	18 October 2011
Participant Information Sheet: School Group	3	18 October 2011
Participant Information Sheet: Traumatic Brain Injury Group	3	18 October 2011
Protocol	2	20 October 2011
Questionnaire: Demographic information	2	29 July 2011
Questionnaire: Information on injury for traumatic brain injury and orthopaedic injury group	2	29 July 2011
Questionnaire: strengths and difficulties questionnaire	1	29 July 2011
Questionnaire: theory of mind task	2	29 July 2011
Questionnaire: empathy quotient	1	29 July 2011
Questionnaire: Metacognition questionnaire	1	29 July 2011
Questionnaire: procedural instructions for the CST from Quakley et al	2	29 July 2011
Questionnaire: Stimuli for the CST task from Quakley et al	2	29 July 2011
Questionnaire: Procedural instructions and stories for the thought to feeling story card linking task.	2	29 July 2011
Questionnaire: Spence Children's Anxiety Scale		
Questionnaire: Mood and Feelings Questionnaire		
Questionnaire: Wechsler Abbreviated Scale of Intelligence		
Questionnaire: Behaviour Rating Inventory of Executive Function		
REC application	83389/236503/1/	29 July 2011

This Research Ethics Committee is an advisory committee to East of England Strategic Health Authority
*The National Research Ethics Service (NRES) represents the NRES Directorate within
the National Patient Safety Agency and Research Ethics Committees in England*

	143	
Response to Request for Further Information	Amy Carroll	17 October 2011

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "*After ethical review – guidance for researchers*" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

11/EE/0328	Please quote this number on all correspondence
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With the Committee's best wishes for the success of this project

Yours sincerely



Dr Rowan Burnstein
Chair

Email: Nicky.Storey@eoe.nhs.uk

Enc "After ethical review – guidance for researchers"

Cc: Miss Tracey Moulton
Research, Enterprise & Engagement Office
The Registry
University of East Anglia
Norwich, NR4 7TJ

This Research Ethics Committee is an advisory committee to East of England Strategic Health Authority
*The National Research Ethics Service (NRES) represents the NRES Directorate within
the National Patient Safety Agency and Research Ethics Committees in England*



Health Research Authority

NRES Committee East of England - Cambridge Central

Victoria House
Capital Park
Fulbourn
Cambridge
CB21 5XB

Tel: 01223 597750
Fax: 01223 597645

29 January 2013

Miss Amy Carroll
Doctoral Student in Clinical Psychology
care of Kerensa Rands, Elizabeth Fry Building
University of East Anglia, Norwich
NR47TJ

Dear Miss Carroll

Study title:	Cognitive Behavioural Therapy Skills in Children who have Survived a Traumatic Brain Injury
REC reference:	11/EE/0328
Protocol number:	N/A
Amendment number:	Substantial Amendment AM01 IEAS Code: 83389/405022/13/376/14908
Amendment date:	21 January 2013
IRAS project ID:	83389
Amendment Summary:	Current CI Ms Amy Carroll is no longer able to complete this study for her educational research in the doctorate in clinical psychology (University of East Anglia). Ms Jessica Ingham will complete the study instead and will be the named chief investigator. The Participant Information Sheets and other correspondence have been revised to include Jessica's contact details. A copy of Jessica's CV is also enclosed. On the consent form for children with acquired brain injury, an additional item has been added asking if parents consent to their child being added to a Volunteer Research Participant Register, hosted by UEA and Dr Anna Adlam. Recruitment criteria is being expanded to include acquired brain injury in addition to traumatic brain injury. Changing a measure from the WASI to the 2-subtest short form WISC-IV to reduce testing time. Addition of a covering letter to the parents regarding completion of questionnaires. Change of study title to: 'Cognitive Behavioural Therapy Skills in Children who have Sustained an Acquired Brain Injury'

The above amendment was reviewed at the meeting of the Sub-Committee held on 28 January 2013 by email correspondence.

Ethical opinion

None

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Consent to Share (Norfolk & norwich)	Version 4	18 January 2013
Consent for Orthopaedic Injury Control Group (Norfolk & Norwich)	Version 4	18 January 2013
Consent form for School Participants	Version 4	18 January 2013
Consent Form for Head Teachers	Version 4	18 January 2013
Assent Form	Version 2	18 January 2013
Investigator CV : Jessica Ingham	Version 1	18 January 2013
Protocol	Version 3	18 January 2013
Notice of Substantial Amendment (non-CTIMPs) : Substantial Amendment AM01 IEAS Code: 83389/405022/13/376/14908		21 January 2013
From Jessica Ingham		22 January 2013
Aquired Brain Injury Group Consent Form (CPFT)	Version 4	18 January 2013
Letter to Headteacher	Version 4	18 January 2013
Covering Letter to Parents	Version 1	18 January 2013
Consent to Share (CPFT)	Version 4	18 January 2013
Participant Information Sheet: For School Group	Version 4	18 January 2013
Participant Information Sheet: For Orthopaedic Injury Control Group	Version 4	18 January 2013
Participant Information Sheet: For Aquired Brain Injury Group (CPFT)	Version 4	22 January 2013

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

R&D approval

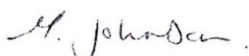
All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

Yours sincerely

PP 

Revd Dr Derek Fraser
Chair

E-mail: melanie.johnson@eoe.nhs.uk

Enclosures: *List of names and professions of members who took part in the review*

Emailed To: *Ms Nicola Holloway, : nicola.holloway@cpft.nhs.uk*
Miss Tracey Moulton: t.moulton@uea.ac.uk
Miss Amy Carroll: amy.carroll@uea.ac.uk

25 July 2013

Miss Jessica Ingham
63 Howard Road
Cambridge
CB5 8QT

Dear Miss Ingham,

Study title: Cognitive Behavioural Therapy Skills in Children who have Survived a Traumatic Brain Injury
REC reference: 11/EE/0328
Protocol number: N/A
Amendment number: Amendment 2
Amendment date: 27 June 2013
IRAS project ID: 83389

The above amendment was reviewed at the meeting of the Sub-Committee held on 22 July 2013 by the Sub-Committee in correspondence.

Ethical opinion

1. The committee recommend that the additional information being stored should be done, according to the relevant policy and procedures.

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Protocol	4	10 June 2013
Notice of Substantial Amendment (non-CTIMPs)	Amendment 2	27 June 2013
Participant Consent Form: Acquired Brain Injury Group Consent Form (CPFT)	5	27 June 2013
Participant Information Sheet: Acquired Brain Injury Patient information Sheet	5	27 June 2013
Participant Consent Form: Consent to share CPFT	5	27 June 2013

Participant Consent Form: Consent to share (Norfolk & Norwich)	4	27 June 2013
Recruitment poster for clinicians	1	27 June 2013
Media Advert	2	27 June 2013
Participant Consent Form: Consent form for school group	5	27 June 2013
Participant Consent Form: Consent form for head teachers	5	27 June 2013
covering letter to parents	2	27 June 2013
Letter to Head teacher	5	27 June 2013
Participant Information Sheet: Information Sheet for School group	5	27 June 2013
Recruitment letter for potential ABI participants	1	08 July 2013

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

11/EE/0328:

Please quote this number on all correspondence

Yours sincerely



pp

Reverend Derek Fraser
Alternate Vice Chair

E-mail: NRESCommittee.EastofEngland-CambridgeCentral@nhs.net

Enclosures:

List of names and professions of members who took part in the review

Copy to:

*R&D Contact - Ms Nicola Holloway
Sponsor - Miss Tracey Moulton
Student – Miss Carroll*



Health Research Authority
NRES Committee East of England - Cambridge Central

The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS

Tel: 0115 883 9390

31 December 2013

Miss Jessica Ingham
63 Howard Road
Cambridge
CB5 8QT

Dear Miss Ingham,

Study title:	Cognitive Behavioural Therapy Skills in Children who have Survived a Traumatic Brain Injury
REC reference:	11/EE/0328
Protocol number:	N/A
Amendment number:	3
Amendment date:	20 December 2013
IRAS project ID:	83389

Thank you for submitting the above amendment, which was received on 20 December 2013. It is noted that this is a modification of an amendment previously rejected by the Committee (our letter of 13 December 2013 refers).

The modified amendment has been considered on behalf of the Committee by the Chair.

Ethical opinion

There were no Ethical issues

I am pleased to confirm that the Committee has given a favourable ethical opinion of the modified amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved are:

Document	Version	Date
Participant Information Sheet	6	04 November 2013
Participant Consent Form: Parental	6	04 November 2013
Protocol	5	04 November 2013
Modified Amendment	3	20 December 2013
Covering Letter		16 December 2013
Letter to members of volunteer panel	1	19 December 2013

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

11/EE/0328:

Please quote this number on all correspondence

Yours sincerely,



Mrs Carolyn Read
Chair

E-mail: NRESCommittee.EastofEngland-CambridgeCentral@nhs.net

Copy to: *Ms Nicola Holloway, Cambridge and Peterborough NHS Foundation Trust*
Miss Tracey Moulton

Appendix L

Permissions

This appendix section contains the letters of approval from the Research and Development departments for Cambridgeshire and Peterborough NHS Foundation Trust, Cambridge University Hospitals NHS Foundation Trust, and Oxford University Hospitals NHS Trust. A copy of an email is also included from the Professional Reference Group of the Child Brain Injury Trust providing permission.

Understanding mental health, understanding people
Research and Development Department

09 December 2011

R&D Ref: M00472

Amy Carroll
Elizabeth Fry Building
University of East Anglia
Norwich
NR47TJ

Box 277
Addenbrooke's Hospital
Hills Road
Cambridge
CB2 0QQ

Direct Dial: 01223 596371 ext 6371
E-mail: rachel.kyd@cpft.nhs.uk
www.cpft.nhs.uk

Dear Miss Carroll

11/EE/0328 Cognitive Behavioural Therapy Skills in Children who have Survived a Traumatic Brain Injury

In accordance with the Department of Health's Research Governance Framework for Health and Social Care, all research projects taking place within the Trust must receive a favourable opinion from an ethics committee and approval from the Department of Research and Development (R&D) prior to commencement.

R&D have reviewed the documentation submitted for this project, and has undertaken a **site specific assessment** based on the information provided in the SSI form, and I am pleased to inform you that we have no objection to the research proceeding within Cambridge and Peterborough NHS Foundation Trust.

Sponsor: University of East Anglia

Funder: No external funding

End date: 28/09/12

Protocol: v2 dated 20/10/11

The project must follow the agreed protocol and be conducted in accordance with all Trust Policies and Procedures especially those relating to research and data management.

Honorary Research Contracts (HRC)

Members of the research team must have appropriate substantive or honorary contracts with the Trust prior to the study commencing. Any additional researchers who join the study at a later stage must also hold a suitable contract. For more information on whether you or any of your research team will require a research contract please liaise with the R&D office. **It is your responsibility to inform us if any members of your team do not hold contracts with the Trust.**



HQ Elizabeth House, Fulbourn Hospital, Cambridge CB21 5EF
T 01223 726789 F 01480 398501 www.cpft.nhs.uk

In partnership with the University of Cambridge

Risk and Incident Reporting

Much effort goes into designing and planning high quality research, which reduces risk; however untoward incidents or unexpected events (i.e. not noted in the protocol) may occur in any research project. Where these events take place on trust premises, or involve trust service users, carers or staff, you must report the incident within 48 hours via the Trust incident reporting system on www.cpft.nhs.uk. Alternatively, you may contact the R&D department for further guidance

Research Governance, Confidentiality and Information Governance

Whilst conducting this study, you must fully comply with the Research Governance Framework. This can be accessed at <http://www.dh.gov.uk> website then use the DH search facility. All personnel working on this project are bound by a duty of confidentiality. All material accessed in the Trust must be treated in accordance with the Data Protection Act (1998).

All parties involved in this research should familiarise themselves and comply with the Trust's policies and procedures available on the Trust website:

<http://www.cpft.nhs.uk/Publications/Documents/GuidePractice/DtGP/tabid/486/language/en-US/Default.aspx>

Protocol / Substantial Amendments

You must ensure that the approved protocol is followed at all times. Should you need to amend the protocol, please follow the Research Ethics Committee procedures and inform all NHS organisations participating in your research.

Monitoring / Participant Recruitment Details

Your proposed local end date is 01/06/2012. At this time your study will be closed at CPFT if no reports or extensions are sought from the R&D office, and CPFT R&D approval will be revoked.

Updating Records

It is your responsibility to keep the R&D department informed of any changes to your contact details, or any changes to the research team and their contact details.

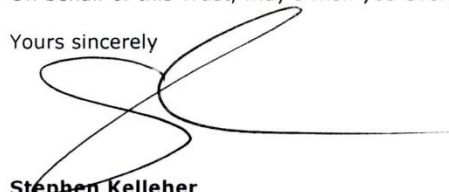
Final Reports

At the end of your research study, we will request a final summary report so that your findings are made available to local NHS staff. The details from this report may be published on the Trust intranet site to ensure findings are disseminated as widely as possible to stakeholders.

Failure to comply with any of the above may result in withdrawal of Trust approval.

On behalf of this Trust, may I wish you every success with your research.

Yours sincerely



Stephen Kelleher
Senior Research and Development Manager

Email confirmation of CPFT approval after change of Chief / Principal Investigator
following substantial amendment 1:

Actions

To:

M

[Jessica Ingham \(MED\)](#)

Ethics and R&D, R&D emails

06 February 2013 11:15

Hi Jess

Okay, I thought that you were planning on recruiting from Addenbrookes soon, if you aren't then can I withdraw the application here?

I have changed Amy as CI /PI to you in the CPFT database, so you are fine to go ahead at CPFT.

Best wishes

Rachel

Rachel Kyd PhD | Research Governance Coordinator
R & D Department
Cambridge University Hospitals NHS Foundation Trust
Tel: 01223 596371 | Ex: 6371

4th April 2014

R&D Ref: M00472

Miss Jessica Ingham
Doctoral Student in Clinical Psychology
c/o Kerensa Rands, Elizabeth Fry Building
University of East Anglia, Norwich
NR47TJ

Joint Research Office
Box 277
Addenbrooke's Hospital
Hills Road
Cambridge
CB2 0QQ

Direct Dial: 01223 596472 ext 6472
E-mail: alexandra.leech-faragher@cpft.nhs.uk
www.cpft.nhs.uk

Dear Miss Ingham

M00472 – Cognitive Behavioural Therapy Skills in Children who have Survived a Traumatic Brain Injury (REC 11/EE/0328)

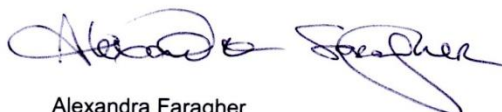
Thank you for notifying R&D of substantial amendments 1 (21/01/13), 2 (27/06/13) and 3 (20/12/13) and the associated documentation:

- Protocol, v.5, 04/11/13;
- Participant Information Sheet, v.6, 04/11/13;
- Participant Consent Form: Parental, v.6, 04/11/13;
- Modified Amendment, v.3, 20/12/13;
- Letter to Members of Volunteer Panel, v.1, 19/12/13;
- Participant Consent Form: Acquired Brain Injury Group Consent Form (CPFT), v.5, 27/06/13;
- Participant Consent Form: Acquired Brain Injury Patient Information Sheet, v.5, 27/06/13;
- Participant Consent Form: Consent to Share CPFT, v.5, 27/06/13;
- Recruitment Poster for Clinicians, v.1, 27/06/13;
- Media Advert, v.2, 27/06/13, 27/06/13;
- Recruitment Letter for Potential ABI Participants, v.1, 08/07/13;
- Assent Form, v.2, 18/01/13;
- Investigator CV: Jessica Ingham, v.1, 18/01/13;
- Participant Information Sheet: For Acquired Brain Injury Group (CPFT), V.4, 22/01/13.

I also wish to acknowledge that you have asked for a minor amendment to extend your study until 30th June 2014, in line with your annual review submitted to REC.

I can confirm that these changes do not affect research governance and therefore the study can continue.

Yours sincerely



Alexandra Faragher
R&D Governance Officer



HQ Elizabeth House, Fulbourn Hospital, Cambridge CB21 5EF.
T 01223 726789 F 01480 398501 www.cpft.nhs.uk

A member of Cambridge University Health Partners

Research and Development Department

R&D ref: A093005

12 August 2013

Dr Anna Maw
Child Development Centre, Box 107
Addenbrooke's Hospital
Hills Road
Cambridge CB2 0QQ

Box 277
Addenbrooke's Hospital
Hills Road
Cambridge
CB2 0QQ

Direct Dial: 01223 596472
Switchboard: 01223 245151

E-mail: beth.muldrew@addenbrookes.nhs.uk
r&denquiries@addenbrookes.nhs.uk
www.addenbrookes.org.uk

Dear Dr Maw

Re: 11/EE/0328 11/EE/0328 CBT skills in children who have survived a TBI

In accordance with the Department of Health's Research Governance Framework for Health and Social Care, all research projects taking place within the Trust must receive a favourable opinion from an ethics committee and approval from the Department of Research and Development (R&D) prior to commencement.

R&D have reviewed the documentation submitted for this project, and has undertaken a **site specific assessment** based on the information provided in the SSI form, and I am pleased to inform you that we have no objection to the research proceeding within Cambridge University Hospitals NHS Foundation Trust.

Sponsor: University of East Anglia

Funder: University of East Anglia

End date: 31 December 2013

Protocol: Version 4 dated 10 June 2013

Conditions of Trust Approval:

- The project must follow the agreed protocol and be conducted in accordance with all Trust Policies and Procedures especially those relating to research and data management. Any mobile devices used must also comply with Trust policies and procedures for encryption to AES 256.
- You and your research team must ensure that you understand and comply with the requirements of the NHS Confidentiality Code of Practice and the Data Protection Act 1998 and are aware of your responsibilities in relation to the Human Tissue Act 2004, Good Clinical Practice, the NHS Research Governance Framework for Health and Social Care, Second Edition April 2005 and any further legislation released during the time of this study.

Innovation and excellence in health and care

Addenbrooke's Hospital | Rosie Hospital

NIHR – Cambridge Biomedical Research Centre | Academic Health Science Centre – Cambridge University Health Partners

V8 June 2012

- Members of the research team must have appropriate substantive or honorary contracts with the Trust prior to the study commencing. Any additional researchers who join the study at a later stage must also hold a suitable contract.
- You and your research team must provide to R&D, as soon as available, the date of first patient first visit.

If the project is a clinical trial under the European Union Clinical Trials Directive the following must also be complied with:

- the EU Directive on Clinical Trials (Directive 2001/20/EC) and UK's implementation of the Directive: The Medicines for Human Use (Clinical Trials) Regulations 2004;
- the EU Directive on Principles and Guidelines for Good Clinical Practice (EU Commission Directive 2005/28/EC); and UK's implementation of the Directive: The Medicines for Human Use (Clinical Trials) Amendment Regulations 2006;

Amendments

Please ensure that you submit a copy of any amendments made to this study to the R&D Department.

Annual Report

It is obligatory that an annual report is submitted by the Chief Investigator to the research ethics committee, and we ask that a copy is sent to the R&D Department. The yearly period commences from the date of receiving a favourable opinion from the ethics committee.

Please refer to our website www.cuh.org.uk/research for all information relating to R&D including honorary contract forms, policies and procedures and data protection.

Should you require any further information please do not hesitate to contact us.

Yours sincerely



Louise Stockley
Research Governance Manager

Cc

Sue Steel, Contracts Manager, University of East Anglia

HH/JT/RA/10618

Dr Kate Scarff
Paediatric Clinical Neuropsychologist
Oxford University Hospitals NHS Trust
Russell Cairns Unit, Level 3 West Wing
John Radcliffe Hospital
Oxford
OX3 9DU

From the R & D Lead
OUH Research & Development
Joint Research Office
Block 60, Churchill Hospital
Old Road, Headington
Oxford OX3 7LE

Tel: (01865) (5)72974
Fax: (01865) (5)72242
rahman.ahmed@ouh.nhs.uk

10 February 2014

Dear Dr Scarff,

Re: Cognitive Behavioural Therapy Skills in Children who have Sustained an Acquired Brain Injury

Research and Development Reference: 10618
Research Ethics Committee Reference: 11/EE/0328

Confirmation of Trust Management Approval

On behalf of the Oxford University Hospitals NHS Trust, I am pleased to confirm Trust Management Approval and Indemnity for the above research on the basis described in the application, protocol and other supporting documents.

Conditions of Approval

Your attention is drawn to the attached conditions of approval. Breach of these conditions may result in Trust Management Approval being revoked.

Recruitment

The agreed total recruitment target for your study at the OUH site is 6 participants by 30/06/2014 as specified in the SSI form.

To support requirements of the OUH Trust and national recruitment targets, we will be monitoring and publishing outcomes of recruitment for your study. This will include reporting performance against the 70 calendar day period from the time of receipt of a valid research application in R&D to the time of recruitment of the first participant to your study.

Your first participant recruitment target date is 31 March 2014.

In the meantime, if you recruit your first participant into the study then please send the date to researchrecruitment@ouh.nhs.uk

The R&D office will contact you in due course by email to ask about the recruitment progress against this target.

Ethics Correspondence

In order to facilitate good communications and avoid unnecessary delays please copy all correspondence with the Research Ethics Committee (REC) to R&D, providing copies of all relevant documents.

Research Sponsorship

It is noted that University of East Anglia has agreed to Sponsor this trial.

Site Specific Assessment

This Trust Management Approval letter also incorporates site specific assessment for the Oxford University Hospitals NHS Trust site.

Approved Documents

Document Type	Version	Date
Funding Email Confirmation		23 January 2014
Insurance Certificate		22 May 2013
Investigator's CV	Dr Kate Scarff	
Investigator's CV	Jessica Ingham	
Investigator's CV	Dr Andrew Sheridan	
Letter from Sponsor	University of East Anglia	22 January 2013
Media Advert	2.0	27 June 2013
NHS R&D Form		
NHS SSI Form	OUH NHS Trust	
Participant Consent Form: Acquired Brain Injury Group Consent Form	6.0	04 November 2013
Participant Consent Form: Consent to Share	5.0	27 June 2013
Participant Information Sheet: Acquired Brain Injury Patient Information Sheet	6.0	04 November 2013
Protocol	5.0	04 November 2013
REC Amendment approval	Substantial Amendment 1, 21 January 2013	29 January 2013
REC Amendment approval	Substantial Amendment 2, 27 June 2013	25 July 2013
REC Amendment approval	Substantial Amendment 3, 20 December 2013	31 December 2013
REC Favourable Opinion		07 November 2011

Recruitment Letter for Potential ABI Participants	1.0	08 July 2013
---	-----	--------------

I wish you every success with the study.

Yours sincerely,



Ms Heather House
Research and Development Lead

Copy to:	Chief Investigator: Jessica Ingham	jess_ingham@hotmail.co.uk
	Sponsor: University of East Anglia	sue.steel@uea.ac.uk
	OUH Study Finance	study.finance@nhs.net

Jessica Ingham (MED)

Inbox

23 July 2013 15:11

Dear Jessica

Thank you for submitting your proposal to the Professional reference Group. We discussed your proposal today and I am delighted to inform you that the PRG is happy to support your research. There are however, a few points we would like you to consider:

1. Caroline Molloy has indicated that she is willing to support you in finding some families to take part in the research. Please note that the participation of any family we are working with is not guaranteed.
2. Caroline has a full workload and although she is willing to help, she may not be able to identify families
3. We require a short progress report by the end of October 2013
4. Can you [please advise on the timescale of your project.
5. Can we have your authorisation to promote your research within our website
6. Please can you refer to us as Child Brain Injury Trust in your final dissertation

Many thanks and we look forward to working with you

Regards

Lisa Turan
Chief Executive Officer

01869 341075

www.childbraininjurytrust.org.uk

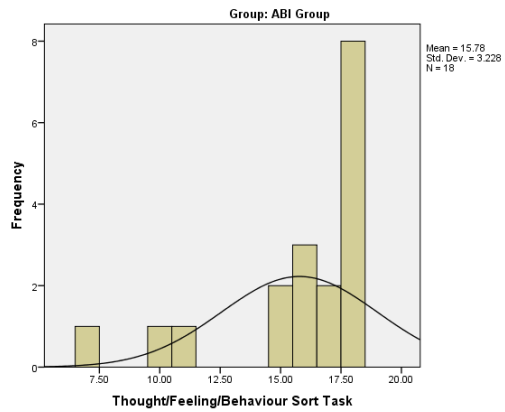
Follow me on Twitter: @cbitlisa follow the charity: @cbituk

Like us on Facebook www.facebook.com/childbraininjurytrust

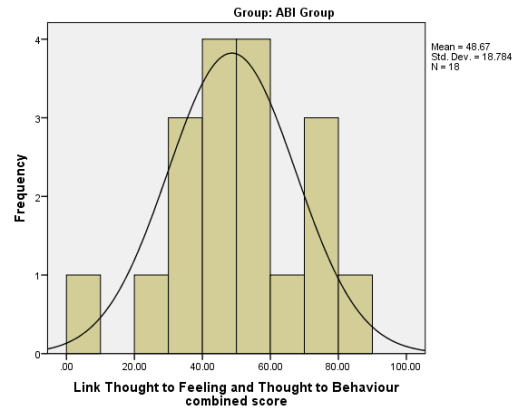
Registered Charity No: 1113326/SC 039703
VAT Registration: 125 7951 96

Appendix M

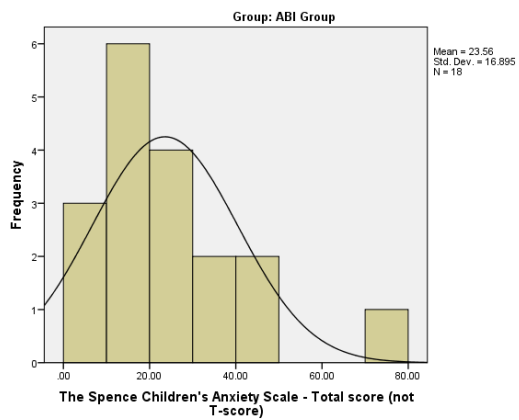
Histograms showing the distribution of the measures – ABI group



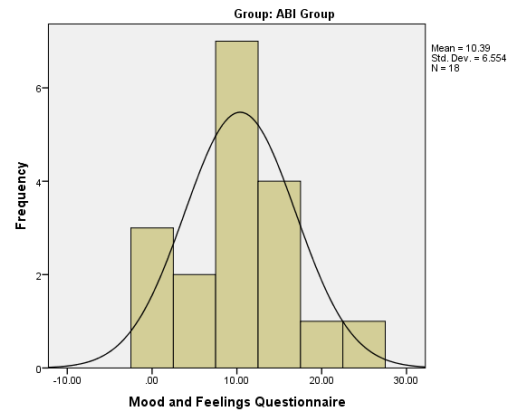
CST



TFTB link tasks

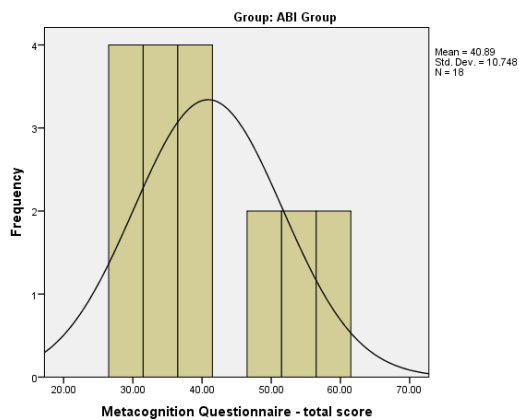


SCAS

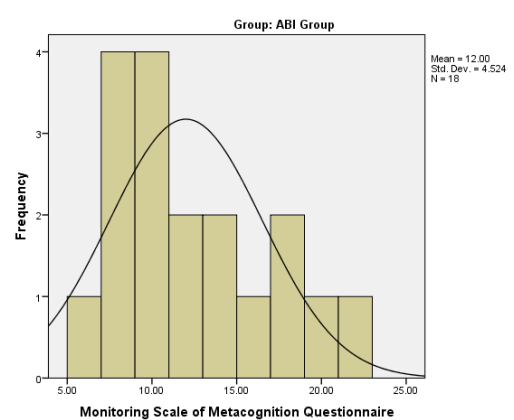


MFQ

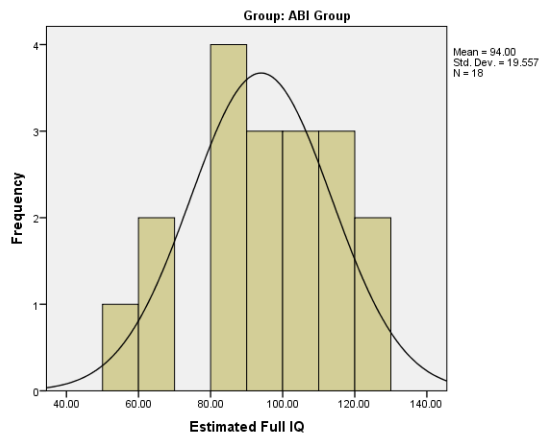
MFQ



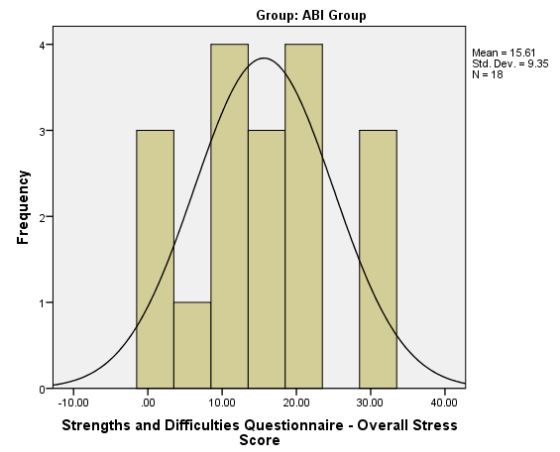
MCQ-C



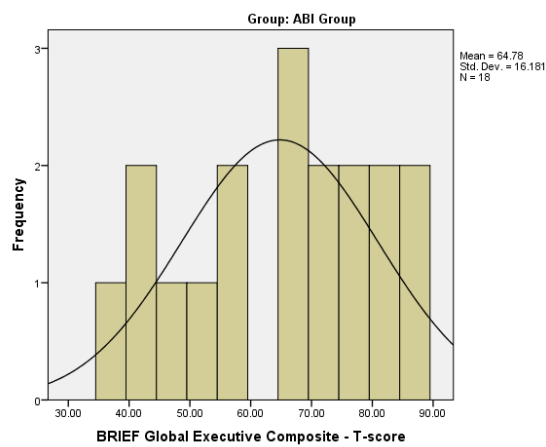
Monitoring scale of MCQ-C



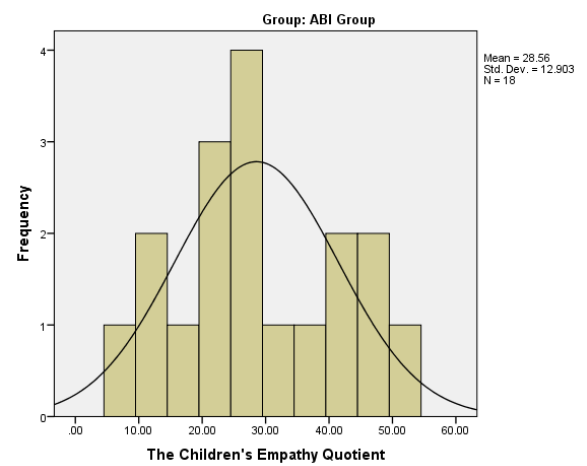
Estimated Full Scale IQ



SDQ



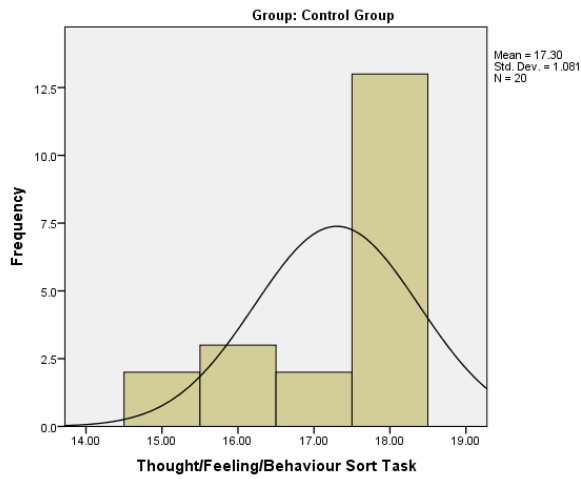
BRIEF - GEC



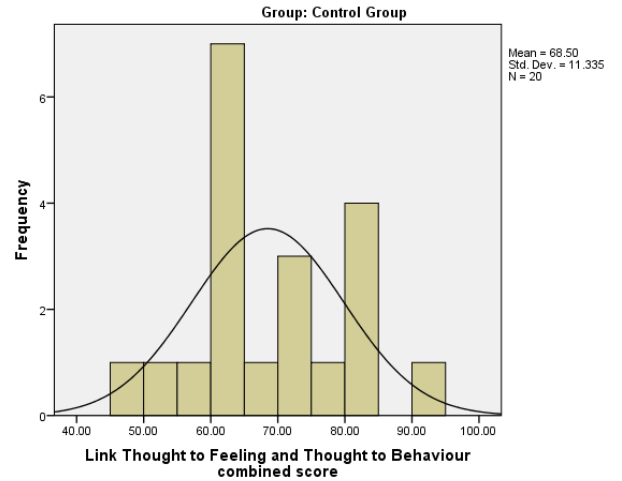
EQ-C

Appendix N

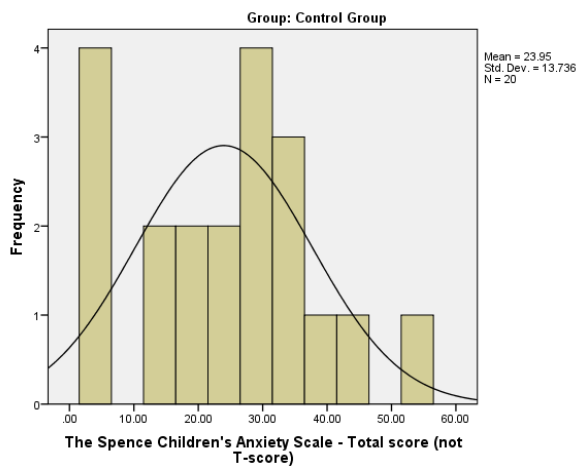
Histograms showing the distribution of the measures – Comparison group



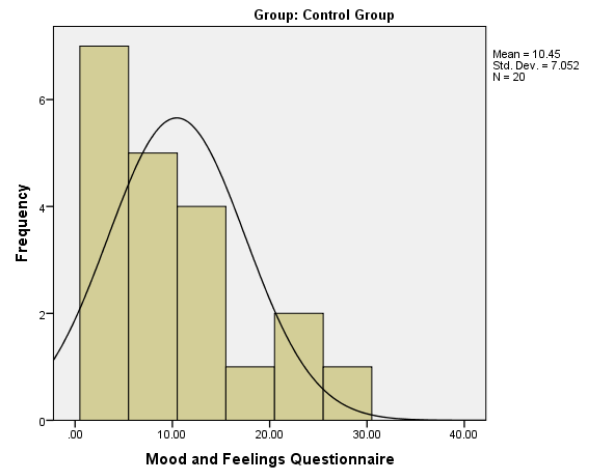
CST



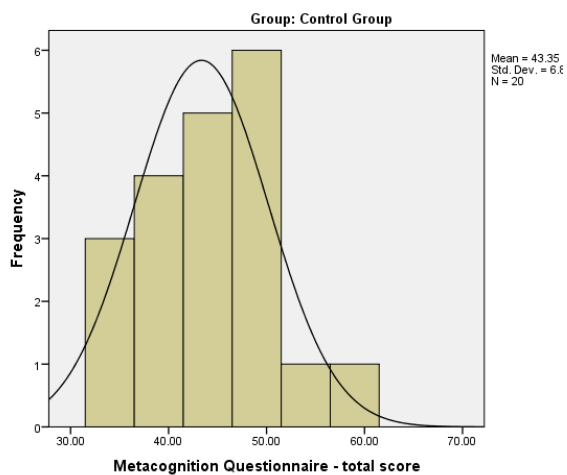
TFTB link tasks



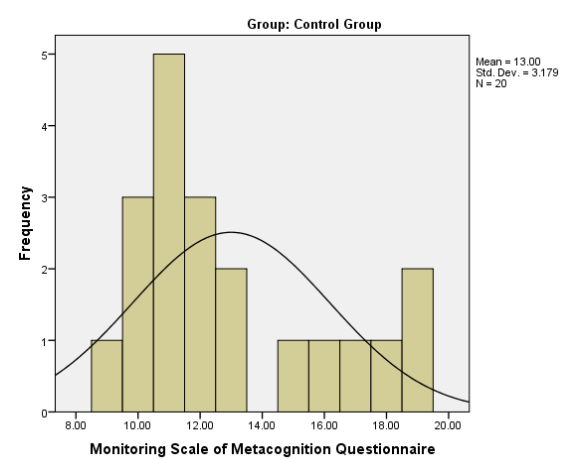
SCAS



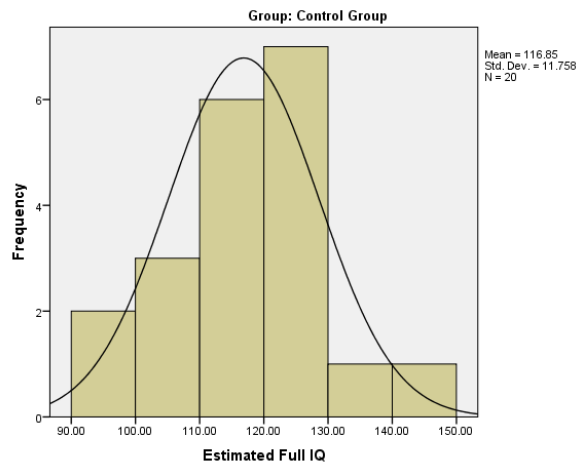
MFQ



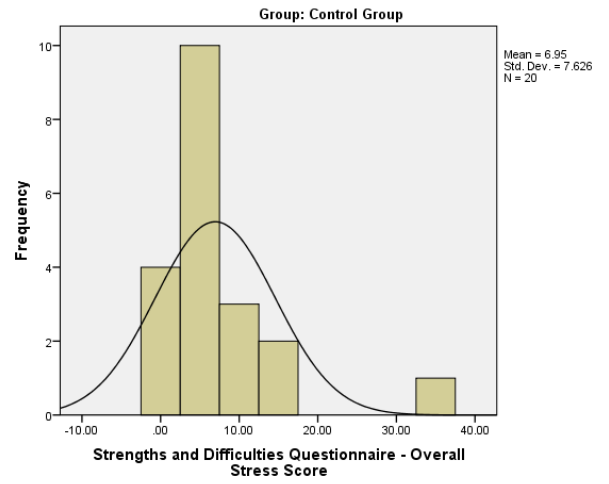
MCQ-C



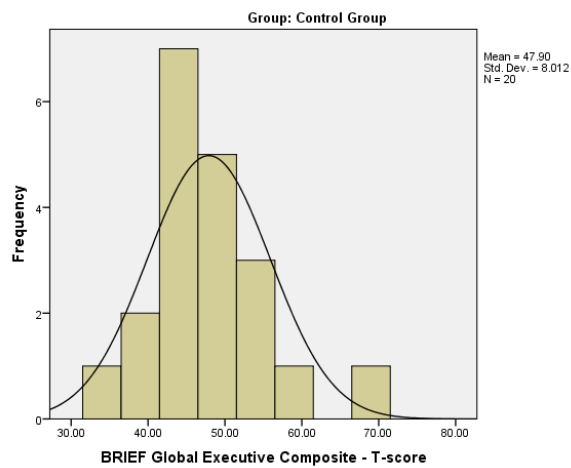
Monitoring scale of MCO-C



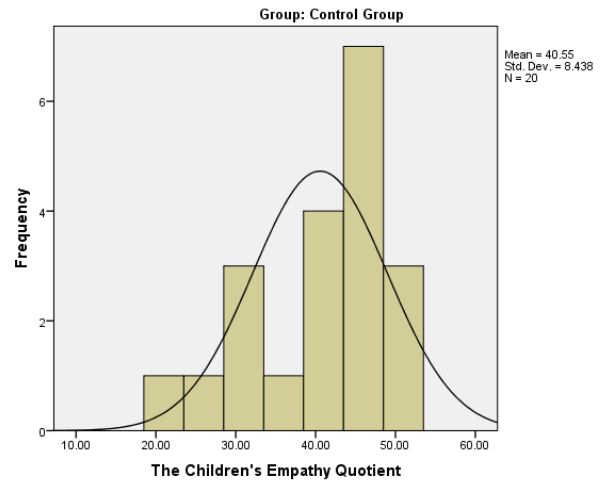
Estimated Full Scale IQ



SDQ



BRIEF - GEC



EQ-C

Appendix O

Supplementary Analyses

Separate analysis of the thought to feeling link task and the thought to behaviour link task in relation to the secondary measures.

	TFLT		TBLT	
Measure	ABI group (<i>n</i> = 18)	Comparison group (<i>n</i> = 20)	ABI group (<i>n</i> = 18)	Comparison group (<i>n</i> = 20)
SCAS	$\tau = .219$ $p = .21$	$r = .124$ $p = .60$	$\tau = -.179$ $p = .31$	$r = .050$ $p = .84$
MFQ	$r = -.119$ $p = .64$	$\tau = .177$ $p = .30$	$r = -.184$ $p = .46$	$\tau = .039$ $p = .82$
SDQ	$r = -.157$ $p = .53$	$\tau = .110$ $p = .52$	$r = -.367$ $p = .13$	$\tau = -.220$ $p = .20$
BRIEF	$r = -.136$ $p = .59$	$r = -.184$ $p = .44$	$r = -.478$ $p = .05$	$r = -.606$ $p = .005$
EQ-C	$r = .224$ $p = .37$	$r = .150$ $p = .53$	$r = .467$ $p = .05$	$r = .506$ $p = .02$
ToM	$\tau = .353$ $p = .09$	-	$\tau = .049$ $p = .81$	-
MCQ-C	$\tau = .047$ $p = .79$	$r = .219$ $p = .35$	$\tau = -.127$ $p = .47$	$r = .203$ $p = .39$
Monitoring Scale	$r = .432$ $p = .07$	$\tau = .174$ $p = .32$	$r = -.037$ $p = .89$	$\tau = .017$ $p = .92$

Note. TFLT = Thought to Feeling Link Task; TBLT = Thought to Behaviour Link Task; SCAS = Spence Children's Anxiety Scale; MFQ = Mood and Feelings Questionnaire; SDQ = Strengths and Difficulties Questionnaire; BRIEF = Behavioural Rating Inventory of Executive Functioning; EQ-C = The Children's Empathy Quotient; ToM = Theory of mind; MCQ-C = Metacognition Questionnaire for Children.